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WHITNEY SOUTH SEA EXPEDITION

of

THE AMERICAN MUSEUM OF NATURAL HISTORY

Extracts from the Journal of

ERNEST H. QUAYLE

Assistant Field Naturalist

Book XXIX through Book XXXIII

June 25--November 30, 1922.

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BOOK XXIX

Voyage of the 'France'

from
Ahunui, Paraoa, Nengonengo

to
Tahiti

Second Aorai Trip.

June 25--August 2, 1922.

June 25

Yesterday a pig was killed and so I broke my fast a little upon fresh pork. In consequence, however, I was again forced to keep to my bunk to evade seasickness.

June 26

Ashore this morning on Dr. Williams' island of Ahunui.

Beck went northeast to the left, so I went to the right down the west side and on around. The land is rather open and storm-washed with clumps of Tohuna trees. Yellow-bill terns in small groups along the beach here and on south where sand prevails. Many small washes and some shallow channels cut across. Tatlers plentiful along the reef, and one golden plover noted. I obtained one curlew here and one at southeast where I met up with Beck, who had just obtained a warbler. We called at length in the same neighborhood before I got the next bird. Later on I obtained one more. Curtis reported having heard one or two. They are very scarce or else very quiet on this island.

Coconuts have been planted here, but the young trees look to be in very poor condition, only a few in each row having grown at all and but one or two of them in a flourishing condition. All the east and most of the north is a narrow shelf of rock upon which is heaped the loose, rocky beach; this is well timbered, however. The best soil is the least forested at present.

Boobies and frigates were nesting in small colonies at one or two places about the island. Noddy terns were noticeable for their absence, and lesser noddies only observed at one place. White terns observed scatteringly all around. Three reef herons were obtained upon my part. One flew overhead while I was above the bush-covered motu and was being chased by half a dozen white terns,--an incident I have frequently noticed. If a

heron crosses above the trees there are usually white terns following as blackbirds do a hawk at home. The other two herons flew up within range of me as I waded across a channel in the first case, and as I stuffed and wrapped that bird the second came up the beach. While tying on my boots three tatlers came within twenty paces of me and fooled around until I took a shot at them. We cut out on the beach around some of the motu, but found walking there quite difficult. Cut across the land through the bush two or three places where it looked best for doves, but found no sign.

Took to the lagoon beach when the last channels seemed to be past. Commenced there, at about southwest, a long stretch of fine sandy beach extending well inland. I attempted to dig a well with a conch shell, but struck a hard-pan at about an arm's length through which considerable effort was required to dig, so gave up. Along the south and east sides of lagoon the rock shelf extends out to the water where it is cut under, the lagoon being two feet or more in depth at the jump off. The elkhorn coral and the purple-mouthed, crimped-edged "oyster" ( ) were abundant here. Many holothurians on lagoon bottom, which appeared covered with short algae of a soft, calcareous structure. The shelf extended over a hundred yards or two to the massive heap of loose coral blocks twelve feet or more high which formed the oceanward bulwark of the atoll here. Very few cocoanuts doing

well along here. Mr. Beck gave me an orange from his supply so well preserved by careful selection and packing that they have lasted about forty days since we left Mangareva.

At the three tall coconut trees (about fifteen feet to crown) met up with Curtis, and all had refreshments. Three large, plump, green nuts were about as delicious as anything I ever drank. This island must be well above ten miles in circumference,--all that one wants to circle in a day's hunt. Even as a walk it is more than it sounds, for the footing is indescribably poor.

Can hear again tonight the sooty terns. We have heard them nearly every night since leaving Marutea, but have seldom, if ever, seen them during the daytime. We have been very disappointed at the last two islands not to find the berry bush upon which fruit the green doves feed. We have eked out what little the natives at Vanavana obtained for us until today, but there isn't much left and some of the birds look rather sickly, two dying this morning. The sandpipers, however, have made themselves thoroughly at home in the hold and cabin where they seem to be reducing the cockroaches very noticeably, and even the ants don't come around as readily as heretofore. One bird especially has become so tame that he comes upon the skinning table every once in awhile and makes a complete survey of it for insects. He always looks in the cracks where he first found plenty of roaches, always goes through the flesh bones,

cornmeal, and catches flies by very cautious sneaking up on them.

June 27

Spent the morning skinning birds. Had to steam into island. An early breakfast and ashore at Paraoa. Wide tidal flat of at least two hundred yards, and high gravel beach very steep,--twelve feet. Cocomut trees planted by natives of Hau doing well and furnish good refreshments. Landing into very small niche. I jumped out with line, and with Tieo's assistance held boat from sucking back. Land is very narrow and rocky, and is somewhat forested around north to east. Whistling in the woods has brought three warblers, two of which have white feathers in the tails, a feature usually met with, but not at the last three islands. The birds are rather quiet at this season, so unless one spends considerable time looking and listening he does not find many.

I went out on the seaward beach and followed around some little distance. Many recent signs of turtle all along it. Got a hunch to enter the woods and was rewarded with two warblers at the place of entrance. Called at length along farther, but got nothing more until returning, when down by the lagoon beach I obtained three from two pair, the fourth one escaping when a poor auxiliary sputtered feebly. These birds are extremely quiet and very difficult to notice at

first as they hop amongst the branches of the trees. One is always surprised that they weren't observed before. The lagoon along this northwest shore laps under the shelf rock, and traveling along it is impracticable. Boobies perching along it in a few trees,--mostly young birds.

Caught up with Beck where he was stripping cocomut trees in search of geckoes. Here a curlew came along and I shot him. It is too bad that we are not going to be out here this next month, which is the critical time in regard to their migrating. These may be stragglers left behind, or it may be possible that many do not migrate. The tatlers are nearly all in winter plumage now and are seldom seen in groups of more than two,--mostly solitary birds. There is a tremendous appeal to these shore birds with their wanderlust. What influences of past ages must be at work to produce such flights as from here to Alaska? Some day I hope to spend two summers and the intervening winter at the best fields on the Yukon for studying their arrival and departure and nesting habits.

June 28

I forgot to mention that yesterday morning's engine run into the island netted us a small fish between the bonita and albacore in size, member of same group. It was the juiciest fish I have ever eaten and was excellently cooked last night. Two other fish were caught, one long, slender fellow with a

fearful mouth, the other more chubby. Best of all, the boys when going ashore for us in the evening saw a turtle swimming just outside the reef. They went after him, whereupon he dove to the rocks below, but within reach of the fish spear. They could not penetrate his shell, so had to hook a fin and so get him to the surface and into the boat. That means a real treat in the meat line.

Ashore about seven this morning and along the seaward beach to east of north side. Walking here not at all bad; gravel rather well mixed with sand. Many turtle diggings of the recent past; nothing very fresh. Tried two holes for eggs, but could not detect any with stake. Cut into lagoon beach and followed it along east side and south to end of wooded land. Several half length channels from lagoon seaward at south end. No signs of land birds. Frigates and red-footed boobies about in considerable numbers. White terns plentiful as usual. Noddies and lesser rather rare and only one yellow-bill observed. Saw one plotus or common booby, but out above the lagoon so could not get it. Warblers are here in the densest patches of brush, where I found them very shy and wary. The land crabs have raided this group of cocoanut trees until few nuts remain. Fortunately there were enough to refresh us in passing both ways. Land is very narrow here,--hardly an eighth of a mile from ocean beach to lagoon.

Ate lunch at the cocoanuts and then continued along

through woods around the motu. Came accidently upon the plotus booby which I had shot at, but had not seen fall. Saw one other old bird during day. Here was a rather dense forest and warblers more plentiful than elsewhere. Four times the auxiliary failed at perfectly easy shots. Have time to call along to about where we turned back yesterday. A shot at a warbler (I now have secured seven) aroused a curlew, which flew about several times before I finally dropped him through the forest bower of leaves. The warblers are best obtained by sitting down and whistling. One here was hopping quietly about in the tree overhead long before I saw him. A second, however, I saw flying this way from the trees ahead of me. While answering one's whistle they perk up the feathers of the head in a very cocky manner. Some merely suck and go on about their bug-search; others are all excited about the whistling. Found another lesser noddy in a tree wherein were several old nests. The auxiliary failed again. Red-footed boobies in tree tops all along here.

Remained in the woods warbling until I had nine birds. The auxiliary missed three on the tenth bird. My shadow was longer than it was when I passed here this morning, so I passed on out to beach trail and commenced hiking. A lesser noddy flying along above the woods attracted a shot. It fell in pandanus, but a warbler came up as I searched for it. Again the auxiliary failed. I would not be outdone now, so continued calling, but again the auxiliary failed. At last, however, the third one is

secured. On to the landing with a vengeance! The boys had a thrilling time coming in. The water is so deep on shelf that they can bring boat up to beach as we did this morning.

At Tureia some canned milk was obtained in exchange for other provisions. It has a dun, brown color and is rather insoluble in hot coffee. We had reverted to cocomut milk, which is preferred by half the table, but since obtaining this none has been grated. This morning I used considerable on some rice and all day felt uneasy inwardly. I was so awfully hungry after my day's jaunt that I would eat dinner in spite of warnings from my stomach. Was barely able to stick at bird skinning until eight o'clock, and the specimens skinned are poor ones requiring a long time.

June 29

We were rather late getting to Nengonengo, which all hope to be the last island of the voyage. I felt too miserable to go ashore and kept to my bunk all day. Beck returned at four o'clock with sea birds, including Fregata minor (?),-- at least the birds look different from the common ones, according to him. I kept to my bunk, having gone on a diet of soft rice and milk. It made me fearfully mad to think that I had to miss one island on the trip.

June 30

There was much shouting and singing last evening when at 4:19 P. M. our course was set for Point Venus, 455 miles distant. The southeast trades were blowing strongly and calculations put us in Papeete before noon on Sunday. This morning we had made more than seven knots per hour during the night. Today the turtle was killed and I had to lie here on my bunk smelling the nearest thing to beefsteak that we have had for five months. It was terribly tantalizing, and I was almost tempted to steal a piece. Had some broth this evening, however, and it certainly tasted good.

July 1

Showers today and the subsequent loss of the trade wind have upset our calculations, but afforded the much needed opportunity to bathe and wash clothes. Alas to be bedridden at such a time! But I feel on the road to recovery this evening and hope to be well able to get up a little tomorrow, at least long enough for a hair cut and insecticide shampoo, for certain unbearable signs give evidence that the nits of Pediculus capita have hatched since the last emulsion of kerosene was applied. Then, too, there is no opportunity of boiling clothes and bedding this side of Tahiti, so at best we can but hope to hold them down to a minimum. What a good instance is this of that law of parasites,--that certain species infest specific hosts and are dis-

tributed wherever the host dwells! These Polynesians are as heavily infested with the vermin as people wearing little clothing can be. The Tuamotuans are notoriously lousy amongst the natives in this region. The Tahitians are not so heavily infested, perhaps owing to their frequent washing and changing of garments; but they are a very finicky people and would rather go on scratching than to apply anything save the most highly perfumed hair tonic. If the alcoholic proportion is high enough that should have some effect.

We are going along at about two knots, which gives us time to clean ship a bit before entering port. I am promising myself a trial at slightly heavier foods tomorrow, since I feel much better today and even went above to behold the most gorgeous evening sky ever seen in tropic seas.

July 2

While being incapacitated I have endeavored to improve my meagre knowledge of natural history. What a blessing that I spent more than a month's wages on books of a technical nature before leaving America! Webster's Unabridged has been indispensable; Schuchert's Historical Geology has been an inspiration and revelation to me; Hegner's College Zoology has somewhat made up for my slighting that important field in my preparatory schooling. Campbell's Botany is not the best botanical work for a field collector; I must send for Gray's Manual and

the Hawaiian Flora. In the insect field I have Comstock's admirable manual and a little preparation under that keen and enthusiastic "bug-chaser", Gordon Ferris. Darwin's Coral Reefs have helped me a great deal to understand something of that phase of life so full of intricacies, while his Naturalist's Voyage has been a constant inspiration,--an ideal toward which to strive.

July 3

The wind during the night dropped off to almost calm, so we had no incentive to gas up today. Today I supervised the cleaning of my quarters, the first they've had in a long time. In cleaning the bunk several little touches of natural history were revealed. A large hairy-legged spider (he looked like a Drassid) was just emerging from his exercise on the inner side of my trunk. Three or four Harvestmen (Phalangidea) were seen amongst pasteboard boxes, books and paper rubbish. One was observed carrying her sac of eggs, a mass about as large as her body. These are not a large species, their legs being less than three centimeters in length if stretched out. I think I must add one more phase to this collecting. It will be at least interesting to know what kinds and how many Arthropoda inhabit a schooner. It might throw some light upon the introduction of species to new islands. Another scorpion was found in my pack sack; I left him there to keep the cockroaches out of it until 'tis needed. Of course the roaches are innumerable; and that

reminds me that our cabin sandpiper has disappeared, just when we've had a wealth of cockroaches for him to feast upon. A bottle of rice filled for one of my night camps with ground doves at Maria yields the following inhabitants: Coleoptera (1), Rhynchophora (1), Orthoptera (1), Scorpionida (1), Euplexoptera (1), Hymenoptera, Formicina (1).

The snout-beetles were very abundant, but appeared to be all of one species. The ants were not very numerous. The other beetle was about one centimeter long (I haven't run him down to suborder). The cockroaches were represented by several Ootheca. The earwigs are as plentiful as the ants. One small scorpion was observed squirming about through the interstices between rice grains with remarkable agility; the claws were held forward and near together as he proceeded through the narrow passages. This population was very thrifty when the boy filled the bottle for my trip ashore at Tenararo. Today all are dead and dried up but the scorpion which has escaped from the corked bottle. Houdini has nothing on the scorpion.

At five o'clock this evening we are about thirty miles from port. The engine now pronounces a speedy end to the first voyage.

July 4

A most glorious gibbous moon revealed Tahiti's mountain splendor to our homesick eyes as we gassed along her northern shore. That long gentle slope of the typical volcano crater

which characterizes Tahiti no matter from what angle she is beheld, and those rugged peaks that stud her central elevations are picturesque and appealing to one who has enjoyed them as I have done these two years past. A little past midnight we sailed through that marvelous entrance between those formidable walls of coral which protect Papeete harbor from the turbulent seas. A steamer alongside the wharf obliged us to tie up at the buoy for the night. Tahiti is home's substitute while in this part of the world. How anxiously everyone awaits the news of tomorrow morning!

We moored off the wharf before the American Consulate. Old Glory flying on all buildings reminds us of the real significance of the day. What thrills one gets when far from home in foreign lands the Stars and Stripes are seen flying beside the plain and commonplace European flag!

A sack of mail was first brought aboard. I had quit my berth as we moored. Sorting the mail required little time, and was great pleasure. I lined up the letters and naturally opened Alice's first. The first one opened, the last written, told me the glad tidings that she had seen Mrs. Beck and was coming to Papeete with her on the July boat. My fondest dreams are about realized. Getting married here has caused some trouble to various parties, but Dr. Cassieu (acting Mayor of Papeete) assured me that a civil marriage would be possible if birth certificates were obtained. Before the Post Office closed I was able to wire Mr. Molloy that his daughter would be married immediately upon her

arrival here.

The Americans in Papeete of the better sort gave a dance with refreshments in the evening, which we attended briefly as an opportunity of meeting our national friends. I withdrew at eleven o'clock, having touched no refreshments and having resisted the desire to dance with the bevy of beauties who filled the hall, outmumbering dancing men at least three to one. The men, for the most part, were assembled around the refreshments. Later reports say hilarity reigned towards morning.

In our mail was a letter to Beck from Gregory of the Bishop Museum, Honolulu, informing us that Dr. Setchel of the University of California was here and would like to meet us to confer in regards to botanical conditions. At the Hotel Tiare I met Drs. Setchel and Parks. Since that meeting I have decided that in the botanical field no better opportunity could have presented itself than this. From him all my collecting problems can be solved. He is especially interested in the flora of the higher altitudes. He says the Tahitian indigenes seem to have retreated inland and upward from the oppression of immigrants. I have already planned to spend a few days with Parks up Fantana canyon, and in those few days hope to get a line up on the plants that are valuable and on those that are not so important. After receiving their advice I may make another ascent of Aorai and get more of the plants, for they are no doubt extremely desirable from there. Other trips are planned, like a tour of the lagoon in the

glass-bottomed boat.

Poor Curtis, returning after our long trip, was greeted with the news of the death of his father. Curtis was a brick, and I am very grateful to him for the confidence I was able to put in his work after one or two practice trips. He worked hard as a sailor and splendidly as a collector, without the least preliminary training in science.

July 5

There was no sleeping last night under my excitement; three hours on my bunk convinced me of that. Arose at two A. M. and wrote letters until a few minutes later when Mr. Beck returned from the celebration; whereupon we set to work packing birds. Daylight saw all the birds packed. The morning was spent nailing up the crates and labelling them. The afternoon saw them aboard a Canadian Miller Steamship, headed for New York via Panama. Everything seems to have conspired for the glory of our maiden cruise.

Now that the birds are off I have a little work overhauling the plants and getting them grouped into bundles from each island. That done and I'm free to take a course in botanical collecting in the South Seas from Dr. Setchel and Mr. Parks. They are staying at the Tiare Hotel, hence our meals and evenings are botanical lectures, or seminars, for he is very anxious to hear about conditions that I have observed; and I,--well, of all the men in the scientific world whom I would have liked to meet in

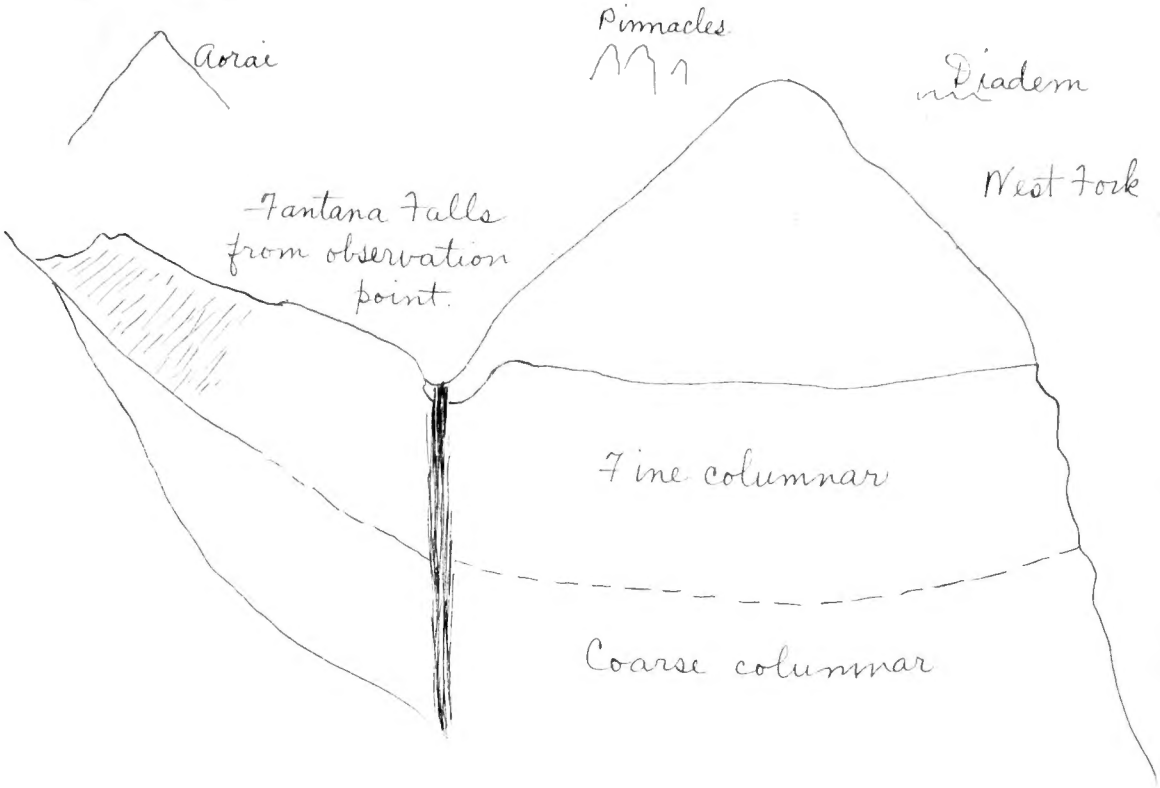
Tahiti just at this time Dr. Setchel is foremost and first! I have learned already how to kill the everlasting Postulaceae which has caused me no little amount of worry, and which I neglected because of its persistance in growing during months and months of blotter drying. He has taught me also that boiling or even hot water will so fix deciduous leaves, petals, etc. that they will not drop off.

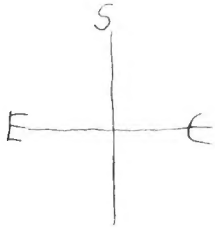
July 6

This morning I announced to Dr. Setchel that my time was now at his disposal. Tomorrow Mr. Parks and I go up Fantana canyon, which is not only the most accessible, but there is the locality of our only specimens of Colocaldia thespesia, Opeia proper. Jimmy the sailor will pack our outfit, Dr. Setchel will pay expenses, and I will carry hunting equipment to care for swifts. Some July kingfishers are desirable and perhaps a dove; the green heron also is expected; and if we make the Diadime ridge the Noha (Pterodroma rostrata) should be nesting.

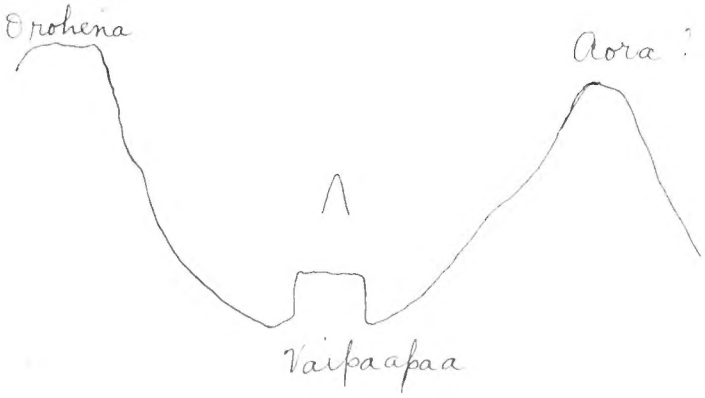
Returned to ship after the evening seminar. Everything ready for the trip except grub. Made another effort to clear my head from Pediculus capita (forgot to save the specimens). Now I can get some idea of just which plants are the most valuable. What I should have is a description of type localities for these French islands, and before we leave here, a similar set of notes of Samoa and Fiji. Why should not this botanical work be done as

well as the birds?





At the point where I came on my last Fantana trip about the time when the swifts were collected, and where I took a picture of the Diadime with a bough of Pua in the foreground. Elevation 1,900 feet (577.6 meters). Elevation where we just left the middle pack trail was 1,750 feet.



July 7

Had the equipment ready when at 6:40 I jumped on the Captain's wheel and rushed to the Tinto restaurant, whereat the "France" crew eats for a hurried breakfast. (17°C. at 3:00 A. M.)

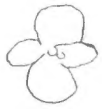
Hastened back to the ship and got everything out alongside the road in preparation. Just had this notebook out (stopped at Maxwell's and purchased a styleograph pen which is a dandy, and two dozen notebooks) when Mr. H. E. Parks came along in the auto. Jimmy from our crew and Noha, the dog, and I piled into car on top of luggage and away we went. Stopped at Spitz and exchanged dark atoll spectacles for clear glass ones so long out of commission. Sped on to and up Fantana canyon road. Imagine then a despicable coolie Chinaman (if anyone doubts the wisdom of America's and Australia's exclusion laws let them visit Tahiti) leading a foolishly spoiled horse up the canyon road and refusing to sidetrack or to hurry before us. He figured not on the men in that car. After "parau-ing" Tinto Tahiti about ten ten minutes to his Chinese obstinacy I jumped out and sidetracked

the man and horse by sheer domineering American nerve, and we went on to the Levy-Chinese managed plantation where we unloaded the car and prepared to hike. Lost no time in packing and good hardy Jimmy laughed at what was expected to be a heavy load--and was. In consequence Mr. Parks and I are free to botanize; and said botanizing commenced immediately.

What a marvel of field efficiency this man is, with a retentive memory that permits extensive collecting of fungi, mosses, ferns, rusts, spots and microscopic forms during the day and detailed notes written accurately at night after said plants are properly pressed! I doubt if his better exists. He appears as near efficiency in this field as Beck is at birds. Oh, for such a man to handle the botanical side of our expedition that I might bend all my energies to the birds!

We proceeded along the upper road, stopping only to breathe when necessary, and talking like blazes and being instructed upon the desirability of certain specimens of plants from microscopic moulds, spots, rusts to the orchids. Brief stop at observation point opposite the falls. Swallows here observed; kingfishers and green dove heard; myna all along. What a pleasure it was to have five months without seeing that despicable creature! Above the pot-hole of the falls along the dugway, which has had many slides recently, we did some work with lens upon the rock wall association. Candle-nut association especially noted at the beautiful groves found here. Orchids and

mistletoe on trees pointed out and scientific names given as we passed them. A brief pause at the old fortification wall (French). Three young half-cast boys here passed from trail down at verge of fall and went down canyon carrying imported roses on their hats. Candle-nut association here with moist conditions commencing to prevail. Dr. Setchel's party had been as high as the old house before, so we did only important collecting here. Saw one little pink flower



which we could not locate in situ, wind blown or dropped from some such garlands as the half-cast boys are fond of. It was unfamiliar to Mr. Parks, so we have that to find Sunday.

Shoved on from fort to and past the house, stopping for lunch at eleven at elevation of 1,750 feet, just prior to the initial division of the trail. While lunching I observed the hawk soaring above ridges, and yellow-billed tropic birds about cliffs; also swallows about bottom of canyon. But birds, unless especially valuable, are subservient for the time being. Plants predominate upon this trip, but I'm equipped to care for birds if found. An extra effort soon had us at the summit of the "Pua ridge", that point between the middle water-fall and west forks where I had collected before. From the same Pua tree Mr. Parks pointed out and I secured for him some very valuable orchids,--at least three species, and some forms of great interest. An association of two ferns which we are

trying to solve today.

There were no birds present in the swallow nest rock, a huge conglomerate which, no doubt, had rolled down from this pinnacled ridge. About the pinnacles I saw no swifts, but while I was hunting for orchids far out on the branches of the Pua tree a yellow-billed tropic went four times above the trail, crossing to and fro. I yelled for Jimmy to shoot it, but I have not given him previous training enough. I shot down from the tree and went myself, whistling to the bird which did not return. A hawk observed high above, so I called pigeon, but he would not descend. We pushed on down to water on the west fork and pitched camp at 1:15 P. M. This was our objective for the day. Oranges and fei present near at hand. Lantana on the trail over the ridge indicates very little travel since I was last here in December or January on the swift trip.

Left Jimmy to establish camp, and with my jacket and gun and field glasses and his Kodak and portfolio, Mr. Parks and I struck up stream. Went almost as far as I have yet been, taking a fei trail up small ravine on slope to left of water. Here we stopped at 2,100 feet elevation at a tall pair of trees over-run by that association of ferns (I've learned of several, one "Acrosticum spicatum" being my first achievement, and "Blackman orientale" being another which I had not collected before because, in my ignorance, I knew not when it was in spore.) Those things I am learning on this trip, and as to orchids,--what a surprise to

learn that three plants collected by me were orchids which I did not recognize as such! What a blessing that these two men are in Tahiti! There is little doubt that their influence upon the collection will be felt immediately and to a marvelous extent. In our birds we have notes and descriptions of type localities; I should have "Flora of French Polynesian Islands" by Drake del Castillego. Just caught a pseudoscorpia.

We returned with three bunches of fei and found Jimmy had already cooked some and had water ready to set on a hot bed of coals. In the bustle of departure I had forgotten that staple article, hard tack, but had two loaves of bread for lunches. Dinner tonight consisted of bally beef boiled, roasted fei, fried bananas and coffee. Went down to stream just before dusk and saw no less than four swifts flying about. Jimmy brought gun and blouse, but I could not see clearly enough to get any at that hour. It was undoubtedly the swift because the wings were much longer than the tail,--no doubt from the pinnacles above Pua ridge. Parks tended his press while I prepared dinner. After dinner he wrote notes of the day and revealed that remarkable memory of his at work.

On page 18 is a hasty sketch of the face of the mountain forming the Fantana Falls, where there is a splendid section across the face of two distinct flows of columnar basalt, the lines of contact being very evident. The upper flow is of fine

columnar structure, the lower one considerably coarser; and below that coarse basalt, non-columnar occurs to base of waterfall. Here is food for geologic thought whenever I stop at observation point. Parks and I talked on into the night. Puffinus obscura were heard in early darkness until past seven; no P. rostrata calls recognized.

July 8

Awakened at three and felt so fresh that I have remained awake, writing ever since. At 4:55 A. M. Puffinus obscura commenced to call from cliffs above. Puffinus obscura (Jimmy tells me their name is "Rao") are calling, the same call that we heard at Gambier. They sound very numerous, but not as abundant as those at Cook's Bay, Moorea,--about like they sounded to us when camped upon the Punaruu plateau. Jimmy has just consented to go on with us today, wielding the great bolo-knife presented to Dr. Setchel by some native chief in Samoa. I have hopes and aims of this time reaching that ridge on the left of the Diadem which looks down into the Punaruu. With Parks along to give me his views and to show me plants, and Jimmy to dig out any shearwater nests found, we should have some beneficial results. Kingfisher heard once or twice during the night. One has already greeted the approach of dawn. Puffinus obscura appears to be very abundant about these precipitous walled ridges. Fantana is

decidedly favorable to their nesting. The main conversation is in the neighborhood of the falls and pinnacles, where there probably are twenty-odd birds, from the sound. 19° C.

5:55. Daylight is approaching. Puffinus obscura calling in much larger numbers, some as they fly past on their way down canyon. Parks says that where they were up the Punaruu at the big bend to the left where the trail ascends the plateau to the right he saw a duck which resembled in size, coloration and shape a big green-head mallard. It was much too large for the Godwell, but the green head was not observed.

I went down stream this morning looking for the swifts, but none were observed. Following the dog I went up the return trail which I did not recognize, but thought it another coming, so cut across to pick up proper trail and got above a steep looking place. Rushed around along steep hillside until just above camp, but lost courage and went back to trail down across river and then up to camp. I lost the best part of an hour, so it was after eight when we started towards the Diadem.

The trail up stream is so obliterated that our only hope was to follow the water. Parks very interested and enthusiastic over his work and so gets an immense amount of pleasure from it. He has eyes like an eagle and seldom passes up a rust or small fungi. If we only had such a man along to take care of the plants, then I could concentrate more upon birds. We saw the

myna all along today and found many fei eaten by them, though Jimmy claimed to have seen a Rupi (Globicera) at the forks of the stream just before. We ascended to an altitude of 2,600 feet up the ridge towards the left pinnacle of the Diadem. Here rain commenced and a small cliff helps us to decide to go no farther. Once there was no chance of getting upon a high ridge, Parks was all for going back to Papeete, and so was I.

At 12:45 we started down trail, gathering up collected plants as we went. At 2:20 we reached camp and broke it up, and at 2:30 started down trail. We thought Jimmy could not possibly keep up with us, but at the pinnacle or "Pua" ridge we had not stopped long ere Jimmy arrived. The same was true at the "fort", and again at observation point. In fact, he was right behind us all the way. In the bird line nothing occurred until we were well down the canyon below the Levy plantation, when a flock of fourteen swiftlets were discovered flying above a Chinese farm. Most of them were too high to hit, but I succeeded in getting one there and a second one a little farther down where the trail rounds a cliff of rock. I was in no condition for swift shooting after having made the hike we had. Reached the "fort" at 3:30; forks of river at 4:00; water-house at 5:00, and Hotel Tiare at 6:05. Barometer at 6:00 P. M., 150 feet at Tiare Hotel. Parks was every bit as fresh and not quite as winded as I at the end of the journey. He would be the ideal man to go along as plant collector on our expedition. To prevent my being detracted from

the main purpose of the expedition a botanist should be along who knew what was most desirable in the plant life, especially algae and reef plants, and lower orders.

July 9

Skinned out the two swiftlets in forty-five minutes this morning, a record I'm elated about. Went down to Tahara Mountain with Dr. Setchel and Mr. Parks to take a lesson on collecting a fringing reef and studying the geology of a wave-worn band and fringing reef. Collected a fossil and some algae, also a typical block from the Lithothamnium zone.

While at luncheon Motete passed. I called him in and arranged for him to go on the next trip, and also wherever we go after the wedding. Learned last night from Dr. Setchel that the flora of the valley heads was the most interesting, and of all valleys that of Papeiha has the greatest record. After lunch Dr. Setchel and Mr. Parks came down to the ship and looked over our retained samples of birds. I spent the rest of the day writing. In the evening we discussed, and later drew up duties of cabin boy and sailors, to be docked five francs at each and every failure to perform any of them.

Heavy showers last night, frequently during day, and again late in evening. We were fortunate to turn back when we did yesterday, and so avoid a series of wettings. Fantana, as is all inland Tahiti, is notoriously moist. Seldom can one make

a journey up there without getting thoroughly wet.

July 10

Had planned a trip up Fantana canyon today for more swiftlets, but the weather has prevented any such efforts. I hope this rainy weather will wear itself out before next week so that we can have a decent trip into the mountains, wherever we decide to go. Have not thoroughly decided where birds and plants and weather will all be the best,--Makatea perhaps. I would like to go after the Noha here, however, during this, their best month.

3:00 P. M. Heavy shower caught me at the court-house trying to get waver through. I shall need seven American citizens as witnesses, but fortunately I can think of that many who will very likely be willing to help me out. What a foolish thing that we do not get birth certificates! Also comes the startling information that a notice must be published ten days before the wedding can take place, and the girl must be present before the notices can be filled out. That means no going far from Papeete during those days. But there are swifts in Fantana and plants everywhere.

Showers continue throughout the day, with real heavy rain at dinner time. Our cabin sandpiper had got down into the lazarette, where no doubt he obtained more cockroaches than in the cabins. We moved him back to the hold. Found great hordes

of young roaches about two to three centimeters in length on certain plants. The pipers grow more gentle every day, but do not let one touch them, their tameness being governed by discretion.

Spent the evening with Dr. Setchel listening to botany and geology.

July 11

Showers again this morning, but not enough to break up our reef and lagoon coralline party. My luck certainly was with me this trip. Saw two white terns coming in from lagoonward early this morning. With Dr. Setchel and Mr. Parks in the glass-bottom boat out into lagoon until we discovered that wind was too high and sea too heavy to do much on the reef. Returned. Took auto to twelve kilometer and went out on Tapuna pass reef, a fringing beach turned with lower flat shoreward extending out a few hundred meters from gravelly point beside gravelly beach. This is at the end of the barrier reef extending on around Papeete to Maturei bay. Here normal changes should be noted in the zone plants Sargassum, Turbinaria, Laurentia and of course the Lithothamnium zone. I kept my notebook busy and obtained some scientific names as we went along the road. At the verge the reef was noticeably higher than the flat between it and the shore, with terrace forming ridges, along the first of which Lithothamnium was found. These terraces very closely resemble

the Minerva terraces of the Mammoth hotsprings in the Yellowstone, an interesting fact and very likely to be explained upon the lines which Dr. Setchel is following. How interesting to find my old playground so directly connected with my life's work!

After lunch went down to ship with sea-weeds, and after setting them out to dry went back to Tiare. With Dr. Setchel and party went out to Tahara Mountain to look for Dodonaea viscosa, which we found in blossom and fruit. I also collected other plants, including the dodder-like cassythia filiformis, which may be the plant found so commonly in the Tuamotus, but I think the real dodder brought from Punaruu more resembles that plant. The red-stamened plant so common in the mountains (Metrosiderous colina, so Dr. Setchel says) was here also.

July 12

High wind still blowing, so we made another visit to the reef at Punaauia for pictures and further search for the Caulerpa, which Dr. Setchel thinks to be the best thing he has collected in Tahiti. Spent most of our time along the Lithothamnium zone. This slopes to seaward at about the same angle as the face of the barrier reef. The sargassum grows next to the lithothamnium; at its further end it intergrades with turbinaria, which latter does not often form an exclusive

zonal flora, but is interspersed with sargassum and on the other hand laurentia. The latter forms the body of the turf which continues on to the rim of the terraces. Loose blocks of coral in pools below the terraces and in them have carved out holes of considerable depth. This may be the commencement of the deepening of that stretch of flat between the reef proper and the shore, the embryo of a lagoon channel, which, when completed, would form a barrier reef. Photographing occupied most of the morning. I obtained a specimen of lithothamnium which forms small finger-like projections, and sometimes, as at Rose Atoll (Samoan Islands), comprises the bulk of the reef. Little points like this and the acquaintance of a man like Dr. Setchel certainly should increase the value of my collecting and note writing. We have received an outline of the information desired concerning ethnological studies; this botanical experience helps considerably. The next expedition should show decidedly increased results in notes at least.

July 13

We had calm weather long enough this morning to permit us to reach the reef. We did not get down to collecting seaweeds. Dr. Setchel obtained certain corals desired. I collected a type specimen from the lithothamnium zone, and we returned, fearing the rising wind. Yesterday and today the natives have been going about dancing and carrying food gifts to the

officials. Today at 3:00 P. M. the celebration commenced. At midnight the celebrators are just getting "keyed up".

Seaweeds collected from Punaauia were well dried today--wrapped up twenty-three numbers. They certainly are much more easily attended to than the other plants. Now that we have an ample supply of blotters, however, we will be well able to care for all the plants we obtain. It will keep me busy in the field, but with an intelligent sailor along to carry the work and help put specimens in the press I should be able to find considerable time for birds. With the seaweeds I put small labels bearing stamp of island, locality, date and my name. This would help with all plants, but would add to the work, always too plentiful upon returning aboard from land.

July 14

The young and spry spent last night in terpsichorean revelry. This morning they were walking the streets in full dress, rather bleary eyed. There was a flag raising performance this morning, but I did not participate. Following it there was a parade of dignitaries which passed along the water front here. White uniforms are very attractive with colored decorations. The school children formed the bulk of the parade, and most of them were girls. Cameras are busy here. I am depending upon recourse to Beck's pictures if I wish personal records.

Our ship is all nicely painted and oiled so that on this day of celebrations and visits it is quite presentable. We have had several visitors already, some people becoming quite interested in birds. Our retained samples are quite attractive, but what yellow specimens the white birds will soon become, with all these sweaty hands touching them! This celebration lasts until Monday morning, when business will again be resumed.

I spent most of the day at the typewriter answering letters and other necessary correspondence. Perhaps I should have gone out celebrating, but did not feel inclined to do so. Our birds had visitors once or twice, but not as many as one would expect.

July 15

Everything astir this morning, which is the Tahitians' day of the celebration. The day commenced with "kimene" contest, which was followed by the dancing forms. Sunshine was too hot for comfort. The "kimene" lasted longer than I could wait, so I missed the dancing that followed. Mr. Beck's pictures of the latter did not give very satisfactory results. The costumes, for the most part, were the modern "puro" bark skirt over the denim overalls, with blue jerseys above. Another tribe followed a yellow scheme, with the "puro" cap and full body dress. These had on but trunks beneath. Another tribe held to green. The little I saw of the men's dancing showed remarkable agility and

cadence.

Father Roget, lessee of Christmas Island, says that he has observed a whole colony of kavaka (sooty terns) exterminated by frigate birds, which eat the young birds and eggs. He says they destroy more birds than do cats.

At the ship I packed up the seaweeds and litho rocks for shipment. How little space they occupy! Also packed the turtle heads and a fleshy fungi in the same gasoline can.

July 16

The concessions were the chief entertainment today, with religious "kimene". During the day the "blue denim" tribe, much the worse for booze, hula hula-ed all about town. The past three nights have been noteworthy for their carousing.

July 17

The tribes are bidding farewell to the Governor, Mayor and Queen today; that means a few hours of their dance before each place. Went to court to pay fee and to have date set for appearance of witnesses--Wednesday at eight A. M. Finished crating and packing, but spent most of day preparing for tomorrow. The Fantana flowering plants are almost ready for shipment. Ample blotter supply is a boon; lamp heat at night cost an extra chimney in addition to oil, but certainly is an effective drier.

July 18

This morning about eight the "Tahiti" entered the harbor. Did not dock for nearly an hour. More than twenty people got off. Mrs. Beck had her usual seasickness,--poor soul! It's a pity she cannot stand the water better. Alice apparently had little sickness and had a glorious time on the trip.

July 19

The "Tahiti" sailed this morning at daylight. The only noteworthy person aboard is Dr. Campbell of Lick Observatory, going to Australia to observe a total eclipse of the sun. I was at the courthouse with my seven witnesses at eight, and after waiting three-fourths of an hour we were told to come back tomorrow. Just as I expected!

Last evening I talked with Dr. Setchel and Mr. Parks, receiving their last advice on plant collecting and their assurances of intent to correspond. How fortunate indeed to have found them here! In my opinion nothing save a botanical collector himself could have been of greater advantage to the expedition. What effort we can spend upon plants will be directed by the information received from him.

July 20

Again at court this morning, with Nordhoff arriving

just in time to prevent our delaying proceedings. Today we had the little child of the movies, Mary Jane Irvin, aboard the "France" showing her the birds. In the evening we went for a swim at the foot of Fantana Avenue, being graciously accommodated by Noble with dressing rooms and shower. Dinner at Diadem with the Becks.

July 21

Out to the barrier reef with Lafe to collect seaweeds. The water was not as low as it appeared at the ship. Made a hurried collection from the inner turbinaria zone to the upper edge of the Lithothamnium zone, but could not go out far on it. Found the zones as distinct as elsewhere. Sargassum invades the turbinaria in a few straggling cases; while the latter are also found merging into the more dense sargassum. The most marked zone line is the Lithothamnium-sargassum one. The latter indicator stops abruptly and the Lithothamnium commences just within the sargassum. Phacenalia and coralline are found coating some projecting rocks; while blue-globed brittle forms are found amongst the other algae. We remained on the reef less than an hour.

Spent the morning on the plants. Informed the Becks of our decision that Alice shall return to the States on the "Tahiti".

July 22

Was busy practically all day with affairs at court.

July 23

Went to Catholic services and high mass at eight. Had an attack of stomach trouble in afternoon.

M. Golaz has a Mexican monkey,--tail about ten inches in length, the reach, when upright, being high enough for her to walk along holding its wrist. It is very fond of the cat, and plays amongst the tree branches with it. One day I observed her holding her bowl of milk down where the cat could reach it. Today M. Golaz had "Jimmy" out on the lawn with the hose for a bath. Jimmy did not like the water at all, and made frantic leaps when the cold stream struck her underparts. Her hands and arms she did not mind being wet. Several times she caught the nozzle and threw it from her. Often she held her hand in the stream and even grasped at it as if attempting to stop its flow. A bar of laundry soap produced great amusement. Jimmy would turn the bar in her hands in a very human manner. She would also rub it about in a puddle before the gentle stream from the hose for all the world like a Tahitian washerwoman. The boy, boy-like, delighted in turning on the full force and scaring poor Jimmy into frantic leaps. In the tub she seemed not to mind, and took pains to keep hold of the soap. But she objected later to being washed, and finally escaped, running down the road. She scaled a tree and played amongst the branches, calling forth fierce rebuke from myna birds. She would not be coaxed down. Later she descended when all was clear, and proceeding up the road entered the monastery. There an Auricaria sp. enticed her, the branches

affording easy means of climbing. From it she was enticed by M. Golaz petting a strange dog. The jealousy of the monkey was immediately aroused, and the poor pup got a severe biting before the monkey was captured and led by the hand like a naughty child back to her kennel. She nibbled the soap occasionally, while the expressions of her face were always interesting.

The red-rumped weaver birds seem to be very much more numerous about town than I ever noticed them before, but this may be because I have been about town more than ever before.

July 24

Ran through the driers today, pasting the thin, uncontrollable-in-a-breeze blotters on either side of the corrugated boards. Had more running about to do today in order to get dispensation. Still raining heavily, with frequent lulls of sunshine. Very heavy shower last night just before midnight.

July 25

The Governor's Secretary, M. Shardon, came in this evening to see birds and pictures, and was very enthusiastic over them. A few showers today, which appear to be the end of the storms. After the storm always comes calm weather and sunshine.

July 26

Out to the reef again this morning with Alice. Her

apron was a handy receptacle for small weeds. She thoroughly enjoyed the waves beating upon the reef. All went well until I tried to show her an octopus, a little fellow perhaps two feet in length. His coloration was so nearly identical with the turbinaria and sargassum and mottled until his outline was thoroughly broken that it was hard to spot him. At the first disturbance he sent considerable sepia into the water. Later as I helped Alice nearer he sent a shot of ink right under our outstretched arms, but fortunately missed our clothing. Alice was quite startled by his actions. The sun getting up and the water high we returned to the boat.

In the evening I went on the bicycle to Fantana and proceeded up canyon until I reached the Chinaman's farm where I had obtained the swifts earlier in the month. Not a bird to be seen save the myna. Heard the little red-rumped weaver birds, and occasionally kingfishers from wooded ravines. About 4:30 one swift appeared. I finally shot it, but failed to find it in bush. Later killed another at the Levy farm. It fell upon metal roof and I could not find it there. Below a cat had found it and disappeared beneath the house with the bird. Later saw half a dozen or eight birds, but could not get any. I killed a swallow at the dugway, where I first observed swallow or swift in September, 1920.

July 27

Our notice went through today with all dispensations

accepted. The wedding will not be before August 7.

July 28

Went with Mr. Hill before daylight for a jaunt up Fantana canyon. He is an enthusiastic Stanford man of the pioneer class, now a High School superintendent and rancher. Have made the forks of the stream at 7:15. One or two kingfishers heard. No swifts or swallows seen yet.

At the water-falls at 8:40. Observation point. A swallow is flying about just below us. Myna chattering all about all the way. On up trail to pinnacle ridge, where Mr. Hill remained while I went on down to camp site of July 6 after cached food and plant blotters. Collected mosses, many of which were in fruit in West Fork canyon. Heard a dove, and overhead the whistle of the hawk. Back at the ridge we had luncheon and then went orchid hunting. Found three in bloom, but one specimen of bulboca and one of the long pendant leafed one. The odoriferous bulbous orchid was very prevalent, so made a good collection of it. Also collected some <u>Lobeliaoids</u> from face of near-pinnacle and ferns. Saw one onion leafed orchid.

As we were botanizing, and later, I saw three swifts flying about the pinnacle. Saw nothing of tropic-birds today. Saw a swift above the pit into which the water falls. He flew

up along the ridge, but not near me. At observation point I expected to find Hill, but he was not there. Thought perhaps I had passed him, so I returned a short way up trail to gather mistletoe. Found the long-leafed orchid in bloom on the same tree, and three fruit burs of the mistletoe host. Two tourists arrived at the water-fall while I was up the tree. They called to me to say Mr. Hill was below. Came down to candle-nut woods below point. While waiting I called and secured a green dove. Mosquitoes very thick and bothersome. While lunching today I caught two flies of blue and gray bands. Also a lizard, but it escaped as I had no bottle.

Proceeded on down hurriedly and crossed the old iron girders of the former bridge. Párks said they sagged with a native, but they didn't with me. All the planking save two on upper side are off, which gave a good solid and clear footing of nearly four miles width. The span was perhaps twenty feet and the drop more. The dog set up an awful howling when I crossed the girder. Just before arriving at the first Tinto's west of river I killed a swift. It fell into lantana and dense thicket. Thither I crawled. Called the dog and awaited results. He finally located the bird for me. Saw several other single birds between there and the Levy place. Walked back and forth twice, but could not obtain any. Hill went on with two tourists. I did not catch up until very near the water-house. Hill then rode on with me.

Reached the ship at 6:10 and hurriedly dressed for

dinner. Forgot the orchids and came back after them. After dinner I escorted Alice to her house. Returned to ship at 8:00 P. M. to put plants in press and skin the two birds. Scalded the mistletoe, hoping it would hold its leaves; have plenty of blotters and will keep the lamp below them most of the night to get them started.

July 29

Was altogether too sleepy this morning to obey the alarm and go hunting. Really shouldn't go anyway, as I have to see the dentist. Better get everything cleared up prior to the expedition after shearwaters on Monday. Manu said some native from his district found the Noha plentiful on a ridge above Vaihiria,--no doubt ascended the ridge directly. Monday the young sailor and I will go to the Aorai Noha colony, and at this season should have good success. May eggs and young birds be present!

It is such a pleasure to have all the blotters necessary for rapid drying of the specimens. The scalding of the mistletoe (for which information thanks are due to Dr. Setchel) appears to be working marvelously. Everything is drying very rapidly and splendidly. Two changes during the day and back above the lamp in the evening have this collection and the pandanus of two weeks ago in perfect condition. Plant collecting on the next trip will be not only interesting but even pleasant.

July 30

Up this morning and blotters changed before going to breakfast. Made arrangements last night for staying at the Cook's. After church we went down to dock and stood around awaiting the departure of the Goldwyn troup until 10:30. I went up after popoi (not made) and returned to Diadem. The Becks arrived saying we could go on the boat if I got there soon enough. I made it. Very interesting watching the taking of the pictures. There is just a little lack of organization on the part of the director apparently. Observed a small flock of P. obscura and terns and a few scattering boobies while at sea towards Moorea. A rather pleasant experience.

July 31

Succeeded in getting packed and ready for Aorai trip by stage time. Buying a tipi held up the stage a few minutes. A Chinese draft wagon carried our load to foot of mountain trail from stage road, where we left at 7:40. Temperature, 70.3 F. Barometer 0 feet. Sky clear; light breeze. White terns are rather prevalent about the tree tops here. Myna and weaver bird very plentiful. Very hot this early with the morning sun on one's back. At 600 feet elevation I have seen four yellow-billed tropic-birds within fifteen minutes, all flying towards Hamuta gorge. This is a beautifully clear day which permits our seeing Tetiaroa even from this low altitude.

Hamuta gorge,--1,000 feet. A rooster is crowing in

the gorge below; myna heard from hillsides. As I look up this steep walled gorge I wonder how Krauth ever got down into it alive. Another rooster crows from the orange ravine. Noticed considerable dodder (?) amongst the fern-brake over the flat slope. Just heard a rail in the ferns below me, but I must not stop here for rail. The chances of getting one here are very slim, while in the upper ravines I'll have some chance. Three old goats and two kids on next ridge eastward.

The vegetation up to 1,300 feet is very similar to that found on the Tahara Mountain. Dodonaea viscosa is scattered all along here; Cassythia filiformis not observed at top of ridge; Metrosiderous colina is very common all along the ridge, but not forming shrub patches. The yellow-flowered, pea-like, stalky plant started at 1,000 feet and formed thick shrubbery. The trail comes into the shade as it works around into Orange Valley. There kingfishers, doves, and the warbler are calling. I try in vain to coax them up out of the ravine. A hawk above will not come down either. I never heard warblers singing so much before,--saw and heard little of them on previous trips. Heard a cat in ravine below, which reminds me of one I killed just below observation point on Fantana trail. They are all through these mountains. No wonder we have not found the ground dove! The boy got some oranges, and they certainly go well at this stage. There must be at least four warblers within hearing at present. The birds seem thicker just below the 1,600 feet level where we strike the bed of the

ravine for the first time.

11:00 A. M. Sky perfectly clear. Thermometer, 72 F. in shade, ravine bottom. 66 F. water in ravine. Found millipeds in burrows in old rotten log where termites and small ants were also residing. A tree here is a veritable collector's paradise. I plan to collect epiphytes and parasites from it on return trip. More hawks above and a few doves calling. Leave at 12:30. Can hardly hope to make fei camp tonight, but will try to. There is considerable collecting to be done here yet. This, perhaps, is the locality of Hamuta in Castillo's "Flora", unless the collectors actually ascended the main gorge. The orchid collected at Fantana is very prevalent here, but I have not yet seen it in bloom. Bulbosa is here also; the others were not noticed. It is excessively hot in spite of the welcome shade. It will be torture ascending the main ridge with the sun behind our backs.

About one hundred feet of climbing calls for wind. Warblers clucking,--I whistle until they get started; then we creep up on one and get him. A short way up the trail we hear another. He comes to tree opposite, but I cannot see him. Another crosses to same tree, an easy long shot. Strange that I never obtained them here before. Never heard them singing so much on the other jaunts. This, however, is an ideal day of clear weather following the storm of yesterday morning. First tree-ferns near trail; elevation 1,825 feet. Have heard no doves since our noon camp, nor warblers since obtaining the two

specimens. As we get into the orange-fei ravine heads the myna becomes very numerous. Tree-ferns are becoming more and more abundant. I was somewhat relieved when Dr. Setchel informed me that but one species had been recorded from here; I have never found anything that appeared at all different. Oranges are rotting on the ground here, though very accessible.

6:15. Barometer, 2,850; thermometer, 65° F. Fog above mountain; light breeze from west.

We found the last climb from the orange valley to the ridge very trying, especially where the over-grown brush made us crawl. Here the twenty meters or more of coconut line came in very handy. What tremendous tension strength it has for its weight! One of us pulling from good footing above helped effectively to get the loads up the steepest trail under the brush. Twice we got off the trail, due to side trails leading around to face of Pirae gorge. On the ridge we ascended the first knob and decided to call it a day. Building camp was but a few minutes' task. A fire and hot supper soon followed, but was interrupted by the first Noha calling as early as 6:10, just as the sun was sinking below the clouds beyond Moorea. The calling bird was evidently aground on the ridge to the westward, the one, I think, where Tuaurai ascends. We will return by way of it and stop long enough to search for the shearwaters there. The bird calls not so often in the characteristic whistle of Pt. rostrata, but with a mournful whine in a nasal tone and but one note, save occasionally when a sharp

"Whang" follows the first. While I was skinning the warblers just before eight I could distinctly hear the calling of a few Puffinus obscura far down in the gorges.

10:30. Temperature, 60° F.

August 1

2:30 A. M. Temperature, 61° F. The same shearwater seems to be calling from the same location this morning, while others are calling beyond and farther up ridge. No doubt they are nesting from here on up. I do not believe they are in any considerable quantity. How odd it is that more of these birds are not observed at sea adjoining this island! There must be at least a hundred ridges in Tahiti where the birds nest. Given an average of but ten birds (which is low enough) there should be at least a thousand birds in this locality. We saw but one bird as we approached the island on the third, and July is their month at home. My opinion is that they travel far to sea each day, for a thousand birds within a radius of ten or fifteen miles certainly could not have escaped our notice so well during all the times we have been out in boats. This would also account for their arriving most numerously at about eleven o'clock in the evening and leaving as early as two or three o'clock in the morning. In some future day I hope to have a year in Tahiti alone, exploring each ridge and the head ravines of each gorge for endemic plants, and incidently studying the life habits of this

strange bird. I would like to band some specimens and visit their nests annually to observe whether or not the same burrow is used by either bird.

A rail was also heard this morning slightly trilling his piping. The lantana has overgrown this trail considerably since last year, branches fully one centimeter in thickness extending one or two meters across the trail. The entangling fern-brake is also bothersome, and may prove to be rather discouraging to my ambitious desire to run up to the summit. Since my conversations with Dr. Setchel I am particularly desirous of collecting plants in the ravine at 5,500 feet elevation and along the very summit. My plan is to get as high as I possibly can today,--the summit if possible. If for no other reason I would like a thermometer record of a night spent up there. 60° is quite cool with but a light breeze blowing.

The Noha do not seem to be very numerous down here, if their calling is an accurate indicator. During the evening the crowing of cocks was very prominent, indicating abundance of fowl in the ravines below. A hen flushed from beneath the last orange tree on the trail, but I had no chance to shoot because of lantana. Still the mournful Noha whines.

4:00 A. M. Temperature, 59.5° F. A few other shearwaters called during the past hour and a half. Roosters just held their morning reveille, or rather first call. My opinion is that the shearwaters are not very numerous here, but it will

pay to watch for their landing places all along the ridge today.

6:00 A. M. Temperature, 59° F.

7:00 A. M. " 64° F.

The sun rises here at 6:50. Have started botanical collecting here where I found a shrub which I do not remember having collected before. I intend to collect even those I know I got last trip, if we don't get overloaded. Will not do much collecting while going up hill, however, but we do not intend to come back over this ridge, so must collect odd specimens here.

Myna commenced chattering loudly at daylight. The kingfisher was heard a little before. Rooster crowing about 4:00 and once later. At about 5:00 I distinctly heard several P. obscura calling in canyons below. The Noha had ceased calling when I went to sleep about 4:00. Swallows are flying about the ridge near camp this morning. Until they came close enough for exact identification I shot at them. Hawks about below and above us. We were very late starting, and progress thus far has been very slow along the brushy trail, off which I have already gone astray. But I never lose a trail, it seems, without finding some specimen worth while. This time it was a large liliaceous herb with a flower stem more than one meter long, a very damp ravine head in the bottom of which we found no pools of water being the habitat. Tree-ferns predominate. Will make permanent, though waterless, camp above here.

We cross over into another ravine head. While resting

I descend it to botanize and look for possible water. None in sight. Find the tree-ferns prevailing, heavily covered with mosses and ferns. Saw one "basket" fern with an old base at least two meters high growing alongside a tree-fern which supported it. The large lily (?) is here, but not in fruit. Collected a lobdaroid which grows on horizontal tree trunks. We have little hope of getting far today unless when we shortly make our base camp traveling proves to be much easier. We will have to take at least two days' food supplies with us. Cool enough in the shade of these tree-ferns where dampness is decidedly noticeable. Myna birds not heard about here. I doubt if they come where fei or oranges do not grow. I intend to watch their altitude particularly this trip. Lantana was along the trail just above camp.

We are now above 3,000 feet. The yellow-flowered pod tree so common on the mountain sides is here along the ridges and above the tree-fern ravine heads. The strangest thing about it is that few epiphytes grow upon its boughs. Other trees and the tree-ferns are covered with epiphytic associations, while it is almost barren of them. The myna bird is now within hearing again. The damp tree-fern ravines seem to be less attractive to them than the drier hillsides. A few clouds today, which helps somewhat in keeping things cool.

We stopped to lunch at 3,250 feet. Temperature at 12:30, 77° F. Cloudy and no breeze. Dug a hole into side of ridge to cache plants and blotters, carrying with us only the

things necessary. We went right past an orange tree at about 3,000 feet without seeing it. Returned and filled up on the oranges, ten sufficing to fill me but not to quench my thirst. Carried about twenty to this camp. Got away shortly after one, with a single pack for the native. My load was reduced only by kerosene bottle and oranges. We will get along on what oil remains in the lantern. The hawks have been seen several times, always safely at a distance. Myna and red-rumped weaver bird still with us.

At 3500 feet I found a small individual of the Tiare Aorae. The Lepodendron commenced just above 3,000 feet and grows constantly more plentiful. The small red-flowered compositae has been very common all along the trail today, as is also the red-stamened shrub. We are now on the grass-covered knob opposite the deep pocket which cuts at right angles to the Pirae gorge. What must have been the formation to have permitted such an odd freak of erosion? Either the volume of water in the sub-gorge was sufficient to carry away the eroded material, or else a soft cross vein existed there, or both. Fog is hanging at about 4,000 feet this afternoon.

Here's my guide--true artist that he is--decorating his wilted tiare hat band with Lepodendron when there's no one to see how well done the job is. I see but one yellow-billed tropic-bird in the gorge below. Just before going around to side to ridge we found water pools in ravine bed not far below

where trail crosses it and just above a high rock wall. It was very welcome, but strangely enough the dog did not seem to be very thirsty. At 3:30 we are very near the fei camp at 3,600 feet. The dog got quite excited at the hole he discovered by himself last October. I hope he does as well now as he did then. The sailor thinks this is one awful trail. If we have success hunting shearwaters tonight we may go on up the mountain tomorrow. Can see two swallows flying about the Noha ridge. Sucking coaxes them overhead near enough to be sure of their identity. Mosses, liverworts and ferns all seem to be more in fruit now than they were in October. The myna is still with us.

Once more in the fei camp, where we arrived about 4:00 P. M. Made a fire and set some oatmeal to cooking, after spilling the first batch. Put up shelter, and then went on over to the shearwater diggings where we had no luck at all. A landslide has destroyed one good location. The dog seemed to find something interesting in one place, but the hole was not completed.

Returned to camp just after dark. Someone has been here within two months, as indicated by brush cuts and the condition of a fei house on our house site. We cleared away all signs of it and made a large bed of fei leaves, which will give a sore and tired back some needed rest. Returning to camp with water, we found our second pot of mush tipped over. We each got a good meal from the remains.

The shearwaters commenced whistling overhead at exactly seven o'clock. At least one other bird has been as close in; others a bit farther away. Temperature at 6:45, 58.5° F. At 7:40 it was the same. Just heard a strange and new noise, like that made with pressed lips into trumpet to make the note of "C".

August 2

12:10 A. M. Temperature, 57° F.

A few Pt. rostrata are calling from below, evidently on a shoulder of the ridge where we cut down into ravine for water. They have altogether too much territory up in these mountains. One cannot hope to find many birds unless a regular colony is found, such as the Noha ridge no doubt once was; but between the natives and me it is now depopulated almost entirely. From Aorae there are three long ridges, and two short ones; from Orohena, three ridges, or really four; from Tahiti, three; from Tetufera, three; from Pie Rouge, three. There are the many kilometers of ridges surrounding the Papenoo and Punaruu valleys. Three in Fantana above all, with possible locations for nesting shearwaters, but where are the birds when at sea? *Why* do we not see more of them? Why just the very few stragglers we have thus far observed from the boats? We heard so few birds nearby during the night (though I admit I slept rather soundly till just now) that I haven't much hope of finding more than one or two birds

tomorrow above camp. I may get mad and make a dash for the mountain summit instead of hunting about all day for shearwaters. It is such splendid weather that a trip to the summit should be well worth the effort. I am particularly anxious to get into the ravine at 5,500 feet to collect plants and hunt for rail.

We were very disappointed upon arriving here to find that all the fei had been eaten. The bed is not an extensive one. I had also hoped for specimens to collect, this being the highest bed of fei I have seen, although I think there is one farther along here below the 4,600 feet knob. A shearwater is above us, but out over valley somewhat. I distinctly heard old "six-noter", but recognized the similarity of his voice to that of the other rostrata. He can merely yodel, and the rest don't get the idea. Slept soundly until six, so heard nothing more of birds. Thermometer 55° F. at 6:20.

BOOK XXX

Second Aorai Trip.

Second Cruise of the 'France'

to

Tuamotu Archipelago
(Niau, Makatea, Rangiroa,
Ahii, Takaroa, Takapoto,
Tikei.)

Huapu, Marquesas Islands.

August 2--September 12, 1922.

August 2

Temperature in sunshine at 8:00, 63° F.

Could not get away before 8:00. We are carrying now the very least possible load for a comfortable night on the summit. Saw no signs of shearwater diggings on the ridge above camp, so shoved on up the mountain. Reached the trail ridge at 9:00 o'clock.

Altitude, 3,950 feet. Temperature, 63° F. in shade. Wind a fair breeze from east. Sky clear save a fog bank above Mona Tahiti. The onion orchid is very prevalent on the trees in the ravine above camp, especially along trail from ravine up to this ridge. At the ridge we find the Tiare Aorae in full condition, a shrub of one to two meters with red berries and small yew-like leaves. The edible purple berry is very prevalent. Ferns just slightly overgrow trail, and "ieie" Freycinetia across in places. Found an orchid that I have not yet collected in blossom and fruit; also another not yet in bloom. Mosses mostly in fruit. Am collecting lobeliaoids wherever found. The flower of the Tiare Aorae is a small, white, bell-shaped corolla with five pointed petal ends, between which the stamens are attached to the corolla. [illegible] cover about one-half of corolla, and are whitish tipped, green based. Found the new orchid blossom,--a very rich dark cream color,--the flower being at the base of the opposite leaves, which are much coarser than the long hanging ones of same style. Bulbosa is here, but apparently past blooming. Just heard a rail in the ravine below. How far from extinct is this little bird! Scientists are too apt to jump at conclusions. Because no collectors since Cook's day found them was no evidence that they did not exist. They are really plentiful, the trouble being in getting sight of them. Any bird collector who spent more than

a week in Tahiti, and especially those who made the Papenoo-Vaihiria trip without hearing the rail must have been very unobservant. Still, had I not stumbled upon the one I got first, I would never have suspected their presence. The noise heard was unidentified by the natives with me. From 4,000 to 4,600 feet seems to be the best altitude for the growth of ravine woods. We are now at the head of the ravine above camp. I should like to spend a full day searching through it, but have not the time this trip since I hope to spend most of tomorrow at 5,500 feet ravine. My sailor is not an average Tahitian in the mountains, though a very good boy aboard ship. He lags behind and says we'll make the summit tomorrow. Well, he may, but I'm going up today, or get so near that there's little difference.

We failed to reach the water can at 4,600 feet until eleven. An hour out there for noon to cook rice. Our grub allowance is not very much, far scantier than last trip; but we have enough for two more good meals, and tomorrow noon we can bake some fern stems, which, with coffee, will not be bad. I would like to find some method of infusing the Tahitian with a little ambition. They do not go into the woods with any amount of enthusiasm, but once they start for home it takes some travelling to keep up with them. He says, however, that if I go to the summit, he will. Well, I'm going. Temperature here after half an hour in shade and out of wind is 64° F.

11:40 A. M. Clear weather with occasional gusts of wind.

Thorough searching of the interior of Tahiti is more likely to reveal the paucity of formerly existing birds and to indicate the probable extinction of several like sandpipers and ground doves than it is likely to discover anything new. Cats, hawks, rats, pigs, and man have been too long at work here. The boy is up a tree with the glasses looking to see if the 'France' is yet upon the slip. A beautifully clear day. Here on a wax leaved shrub, red stamened, is the onion leaved orchid with a cluster of seven blossoms in full bloom. The curled lip is white and lavender, the rest creamy yellow. From the large sweep of country under observation from here I judge the fei at camp to be about the altitude limit. Certainly there are none higher in the Pirae or Fantana gorges. The mistletoe commences just before we reach the one bit of rocky cliff on the trail,-- the one really knife-edged part of ridge, the cliff being a niche in the edge. Tree-ferns predominate on either side of slope, the yellow-flowered tree not being here present. Red staminated shrub here has glabrous leaves as compared to hirsute ones below; upon it the mistletoe is growing in abundance. Ieie not very thick; brake fern dwindling; Lepodendron increasing; Tiare Aorae now prominent; edible berry about as thick, the next commonest shrub being one with reddish spikelet of flowers. But I just saw a seed of that tree on the ridge trail, showing

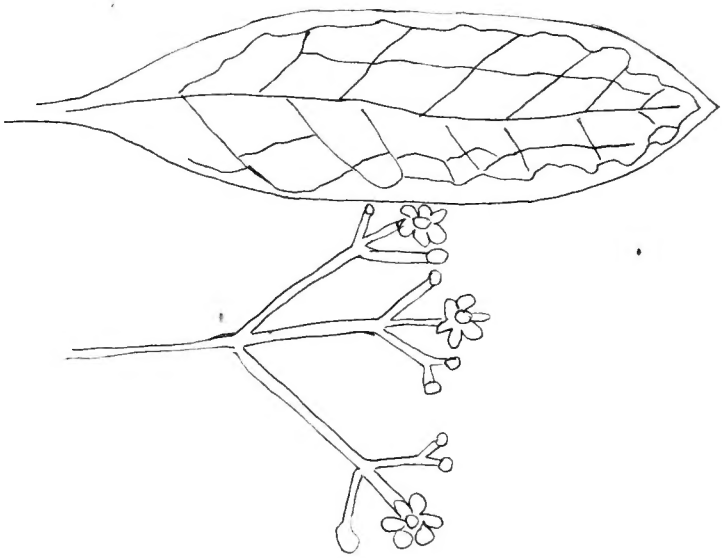
that the wind carries them this high. Climatic conditions may prevent its growth. The rope-cliff was easily ascended, and Noha Uri showed up much better than did Tuaurae's larger goat dog. There were just two bad places where he needed boosting. His nerves are not yet hardened to real rock climbing, but another year should make him a reliable mountaineer. The mistletoe persists, but only upon the glabrous leaved shrub. There are wasps aplenty along here, but no disasters as yet. The tree that Parks and I collected on the pinnacle ridge of Fantana is here, but not overly abundant. The coarse lily-leaved plant collected at 5,500 feet last trip (probably liliaceous) is somewhat abundant along here. No signs of birds. No myna heard since leaving camp this morning. I doubt if they come above 4,000 feet. They appear to roost somewhere below camp, flying up every morning and back in the evening. We found lantana on the Noha ridge (3,700 feet) last evening. Where will it end?

A fog bank rolls in toward the peak from the leeward and hangs on that side. A bank of clouds hides the hilltops of Moorea, while the glittering sunshine upon the ocean surface prevents our seeing Tetiaroa. The ridge which divides Fantana at the bridge is as sharp and knife-edged as any ridge, unless it be the one between the Punaruu and Vaipoapoa valleys,--that razor-edged link between Orohena and Aorae. I am inclined to doubt my former opinion that Fantana canyon is the result of a

former crater. It looks more like plain erosion today. Why should a crater be cut lengthwise by such a ridge as that betwixt the forks? 3,500 feet high. Furthermore, the plateau-like upper region of the east and middle forks does not look crater-like. The most striking feature of the landscape from here is the horizontal strata of the farther wall of the Punaruu valley. On Fantana valley wall (Pie Rouge) the strata slope regularly with the hilltop at less than 15° from horizontal, dipping seaward. In places the ridge is serrated a little, but for the most part it is straight and regular.

Several orchids still to be found; Lobeliaoids not so common; shrubs about as usual, with addition of one with very round leaves and square ribbed stems,--no flower or fruit as yet observed.

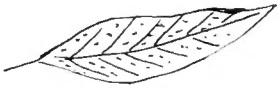
At about 5,000 feet I first noticed the compressed flat lepodendrion. It was very prevalent for the next two hundred feet. Here also is a shrub,-there are no trees along the ridge,-with a glabrous leaf, flowers in clusters of three with three clusters on a stem. It is now becoming one of the commonest shrubs along the ridge. All or most of these ridge shrubs become trees down the side slopes and in ravines. No mistletoe observed for some time.



At 5,500 feet camp at 3:15 P. M. Some fog in Fantana gorge. Rail heard in ravine below here. Down that ravine we will collect plants tomorrow morning, emerging from it to this ridge just above where it drops into Pirae gorge. Fantana upper

valley east fork is certainly a fei garden. Each ravine seems to harbor large beds of the plantain. I have yet to see any above 3,600 feet altitude, all the Fantana beds being below 3,200 feet. The most notable feature of this upper region, even in the ravine below me, is the diminishing number of tree-ferns in comparison to the rest of foliage. The fern which forms the entangling brake along the ridges below has practically disappeared. The lepodendron is still abundant; the monocotyledanous plants are increasing in number. There are two or three varieties, the most common one with fuzzy leaves about .8 to one meter long in large clumps; yellowish flower and red berries in profuse numbers on single stalk.

Since leaving the old camp at 5,500 feet I have not observed a single orchid. The lobeliaoids, too, are scarce, though a few are present; lichens and mosses in profusion on the tree trunks. Often one walks along a broad, moss-covered trunk from knob to knob of the ridge. Here at 5,900 feet is an old land slip into head gorge of East Fantana. The bare rocks are now lichen covered. The ferns have an entirely different aspect. The broad leaved fern so common along moss banked ridges commenced to be prominent about 5,000 feet, and has since increased in importance amongst the ground carpet. Small, broad leaved ferns are common on tree trunks and branches.



Fog still rolls in against ridge from Fantana side. What a sense of chaos it gives, looking down into its fathomless mists!

4:50 P. M. At the main ridge, 6,150 feet altitude. The valley of the Vaipaopao lies clear and dark in the evening shadow below me. Orohena is looming against a distant fog bank. Frisbe's idea of ascending it from Haapape looks feasible. One decidedly difficult bit of climbing at about 6,700 feet on the main peak. The other mountain, Marama (?), looks perfectly easy. The ridge across the Vaipaopao shows no difficulties. It would be a much better route for plant collecting, and no doubt better for shearwaters. Next July perhaps the trip will be made. How I should like to write J. Norman Hall from the summit!

Here at the main ridge is the brake fern again in all its exuberant growth. Evidently the ridge just ascended is merely too damp for its requirements. The red-stamened and pistilled plant is here. The edible berry was at its best along the last stretch, one bush furnishing several mouthfuls. The tree with the red berries along its stems also was seen on last shoulder ridge. The packer was very slow in arriving, but he cut his rest short when I urged hurrying to avoid a threatening shower. A dense cloud bank blew in over Tiari district and precipitated enough into the Papenoo valley to form a rainbow. Up here, however, there does not seem to be any rain. The fog, however, is very dense on all sides of us, and a rather stiff

breeze is blowing. For a moment the Vaipaopao is clear, but another dense bank blows across it. There is no doubt that Orohena is most accessible from the northeast instead of the southwest.

We rushed along the ridge and arrived at the summit at 6:15. Foggy and cool. Matches would not light to observe thermometer. Ate a cold supper of cooked rice, milk, and biscuits, and then turned into the hole here. Early in the night the fog began to precipitate a slow drizzling fine rain. Made a wet night of it and in a cramped position it was none too comfortable. It was not so cold as that night at 5,500 feet camp, however. We had hoped to build a large fire to attract attention from the village, but could not do so on account of wet wood,--what little is here.

August 3

Temperature at 6:15, 55° F. Barometer, 6,775. Foggy and light precipitation. Everything wet and cold. Edward Hall and Red. L. Q. Rain of S. L. C. Utah here in 1904. Other parties including George Spitz in 1883. Collected a heavy bag of mosses, lichens and plants along the ridge down to 6,300 feet. 9:15 in ravine at 6,100 feet. Collected more moss, lichens and ferns. The lepodendron continued along the summit until just last few hundred yards, when fern-brake commenced. Temperature, 56° F.

Hurried on down to get out of the abominable fog, collecting until my hunting blouse bulged. The sack I rolled ahead

down steepest parts of trail, thanks to a good coil of cocomut cinet! It kept accumulating moisture, and when necessary to carry it I found it very heavy indeed. I followed the ravine from the first place it approached the trail around to the second, securing some mosses and ferns not seen elsewhere and beautifully in fruit. Saw no good specimens of flowering plants; no orchids here, but they commenced not far below the 5,500 foot old camp and were found in bloom at about 4,700 feet. The mistletoe is certainly very local in the notch near rope cliff. Does it come up here from one or the other valley head? An excursion down the valley walls (both feasible) would prove very interesting. We have no time for such a trip now, but had I realized the importance of valley heads last year while Motate and I were camped up here so long we would have gone down a few hundred meters on either side. Above here I think I now have a very representative collection of plants. We may decide that there is time to work head of ravine above camp, higher than Motate and I collected.

What a blessing are these two water cans left by Gautier! Of course the prisoners did all the work, and credit really belongs to the Governor, but Gautier's imagination was no doubt the cause of its being done. He told me there was one more on the hill just above Fantana. He found no natural water on the entire route. We have obtained it from two running streams and from pools in beds of two other ravines. Here we have everything, including the plants, out in the sunshine to

dry. I should have brought my tripod along for pictures. It is rather heavy, however, so I'm thinking of obtaining a lighter one.

As we passed along that knife-edge ridge above the rope-cliff two hawks flew out from below us. Isadore had the gun, as I was loaded with plants. They were above Fantana Gorge anyway, and only the best of luck would have found them. It has taken much longer to descend than I anticipated, about three hours to the thousand feet. We will be late in reaching camp, but will just about make it. If I am able to locate any birds by night calling we will spend some time tomorrow morning searching for nests, but I'm inclined to push on to lower camp where birds were heard the first night. I can hear the myna in Pirae gorge not five hundred feet below me. The yellow-flowered tree is on hillside within one hundred meters of here.

Things are beginning to dry now after an hour in the sunshine. I have searched clear back to rope-cliff, looking down either side of ridge for the willow-like shrub, but can find nothing of it. Last time it was neither in flower nor in fruit. Saw but one shrub today. Just about 5,000 feet I found a shrub of the Tiare Aorae splendidly in blossom. Collected several clumps of it, but have little hope of flowering plants remaining in good shape until blotters are reached tomorrow.

It was more of a temptation than I could resist to collect along the trail. I did collect orchids when in bloom or fruit. The willow-like shrub I found as we entered the ravine to

be bearing olives, unless I'm mistaken. I didn't taste them to find out. It was very tempting to enter the ravine, but time would not permit. I had a bag very full of plants and weighing well around forty pounds, besides pockets getting fuller all the time. I carried a larger load than the native, and the gun over half way. We will have a much heavier load going out than we had coming up. I hope to reach orange valley in time tomorrow to get help from orange carriers.

At camp we found everything in good shape and soon had a fire going. A large pot of rice filled us up, served first with pate and second with sugar. There is enough for a small dish with coffee in the morning. At 6:15 I heard a shearwater calling above the ridge along back trail. At 7:30 temperature was 57.5° F. One bird called several times overhead. Old "six-noter" comes up the valley. The former gave a shrill whistle followed by a prolonged whine. Although very tired and sleepy I'm anxious to keep awake long enough to locate one bird or more. If there's anything I hate it is this going back without a shearwater.

A rat just came snooping around the fire. I had nothing to hit him with, so picked up a hot stone from near the fire and threw it at him. He looked much like the large Norway rat. The gun is now loaded and ready for him, but he avoids the lantern light and so I get no chance to shoot. Occasional shearwaters heard; none towards old diggings; one now and again overhead; mostly toward ridge above back trail. There I shall try for them for

a few minutes at least tomorrow morning. A recent fire there might have cleared the ridge so as to afford good landing sites and easy digging.

9:00 P. M. Temperature, 57.5° F. Barometer, 3,650 feet. Light wind fog coming into Pirae valley.

August 4

Slept like a log last night in spite of chilliness due to army blanket being still somewhat wet. Heard shearwaters this morning, but not many and those were towards burnt ridge,-- all before 4:00 A. M. Temperature, 57° F. At 6:15 it read 57.5° F. Barometer, 3,625 feet. Weather clear here, but dense cloud bank to eastward. Myna birds calling this morning. As we were breaking camp the native espied a bunch of fei. Off he went with the tipi, and it was all I could do for lack of Tahitian words to restrain him from cutting down the tree. They have no thought whatever for future wayfarers along this trail. There may be other parties up the mountain this year when I announce the trail open and in good shape, with abundant water. Ormand and Shardun may tackle it. For anyone not encumbered with scientific equipment it is an easy three day trip, with one day spent mostly on the summit. This morning I have the entire outfit, save the plants and one box of cartridges, upon my back. I have given the boy the privilege of going on down today if he desires, while I stay to hunt shearwaters. He struck

a rat with the tipi this morning, but did not get it. Swallows above the fei early.

We left camp at 8:00 A. M. It took an hour for me to get everything tied on my pack. I ascended the burnt ridge to 3,800 feet from 3,500 feet, but found not the slightest sign of shearwaters. Isador went on. I filled my canteen and then hurried along down trail, thinking I would overtake him at the orange cache at least. He played me a dirty native trick,--left his canteen empty and did not even uncover the plants which I distinctly informed him he was to take on with the rest. I already had a heavier load than he and now must add to it about twenty pounds of blotters and plants and five pounds or more of food.

Three yellow-billed tropic-birds flying high in Pirae gorge. Hawk above this ridge. Myna rather quiet, but occasionally heard. Swallows flying about over tree tops. I was due in Papeete yester-evening, but will do well to make it tomorrow evening with all this load. Had I watched from the burnt ridge I could have seen whether or not the sailor carried the plants. A little mist collecting over the mountain now. Temperature in shade on ridge, 77° F. Barometer at 11:00 A. M., 3,400 feet. Hot sunshine scattering clouds fog bank over summit of Aorae.

12:00 M. 3,000 feet. Isadore also took this trail, for he ate an orange here. This is where we located the shearwater the first night. Had he taken the plants so that I would have been

able to walk along with my load I would camp here and hunt birds by moonlight and sound.

A cloudy spell is some relief. The heat was unbearable before with the thermometer at 85° F. It has now dropped to 75° and comfort comes with it. There are several possible places here for the shearwaters to be. I suppose that I really should have remained here and searched these lower ridges for the birds rather than running up the mountain. I hope the plants will prove worth while. It is awful to have to pass up blooming orchids and other odd plants, but I stagger terribly under my present burdens. Will try to make the orange valley at least and may get help from some native tomorrow. Myna is now chattering in all his usual profusion. Two hawks circling high above. Dodonaea viscosa is very prevalent on this ridge where it almost dominates the shrubbery. It has either grown very rapidly since, or else it survived a fire of about three years ago,--a very necessary feature in these islands where the natives fire the ridges to clear their fei and goat trails. They little realize that the worst encumbrances are the first to grow up after the fire,--the fern-brake, lantana and "ieie" for instance.

Had no difficulty getting down the steep fei slopes of Tuaurae's trail, save for the pack's slipping and the lantern's losing its burner. At the orange grove (2,400 feet) at 1:00 P. M. heard the first warbler. Have heard others since, but cannot call

them near. Am determined now to go on just as far and fast as possible, but I have to rest frequently.

2:00 P. M. 2,200 feet. The orange valley did not last long, and at 3:00 P. M. I ate lunch,--a very indiscreet lunch of fancy crackers, Nestle's milk, coffee and jam. The result is no wind and uncomfortable feelings in the pit of my stomach. I succeeded in obtaining two warblers as I rested descending the orange valley, the last shot startling hens in at least three different places. I have never heard the cuckoo here since obtaining the first bird of that species in March, 1921. Doves calling and two seen, but always when warblers were in prospect, so I did not shoot at them. Kingfishers heard occasionally, but not observed. Calling purposely brought two of them into nearby trees. A long auxiliary shot missed, as did also a wing shot following it.

A shower forced me to repack in order to get the plants and blotters that Isadore should have carried down into shelter. The readjusted pack feels much better, but is just as heavy as ever with two plant specimens in addition. The mistletoe, similar to Fantana specimen, extends well along this orange valley, always on the same tree as in Fantana. I just simply couldn't pass the verge of Hamuta without stopping to rest and incidently converse with the rail dwelling in the dense fern-brake over the brow of the canyon wall. Even got a few clatters from him. Monday, if all goes well

about the wedding, I'll be out in the Tiare district where they are abundant. This fellow comes closer, but no chance of getting one here. Still, I may wait until dark in the attempt. Roosters crowing abundantly in the bottom of Hamuta gorge. A heavy squall off beyond Point Venus will just about catch me at the foot of the trail, so good-bye rail!

Moonlight down the trail was rather trying. Twice my ankle turned over rut or rock and let me down to ground; but I succeeded in getting entire pack to foot of the trail. Walked down to village, where Roland loaned me his bicycle for the night. Arriving at Papeete, I dressed and called upon Alice, whom I found suffering from a severe headache. Packed her head in ice, and she finally got to sleep. Had a midnight dinner with O'Reilley and Allan Parks. Spent the morning with them until time to skin out the warblers. It took me thirty-five minutes for two birds,--no labels.

August 5.

After skinning warblers I rode out to Pirae and awaited arrival of Diademe truck. Brought material in and got it into press before dark in spite of diversions such as searching for ministers. Skinned a parakeet in fifteen minutes.

August 6

Out in glass-bottomed boat after a visit to market and

church. Much too much to write about, the chief point of interest being a small octopus which Mr. Jewitt picked up according to my instructions by grasping it behind the eyes. Later he let it get a hold with its tentacles on his arm. A severe mouth bite and very red marks where each sucker grasped his arm. A dinner party with Mr. Hill. Have decided to go to Makatea.

August 7

Spent the night trying to get plants numbered,--an almost hopeless task where there are so many. A good thing, indeed, that we decided that Alice should decidedly not go on voyage. Hope to find the rupi at Makatea. Saturday a Spitz boy gave me a specially interesting petrel which we have not yet identified. The native Paumotu (Raraka) name for ground dove is "o'o".

The rest of the week I took as a vacation, being unable to get arsenic and other necessary equipment ready for the Makatea boat. Accomplished nothing for science and less for myself.

Two days becalmed in port.

We were first billed to sail Friday afternoon, but could not get ready. Saturday morning calm weather outside decided our laying in port another day.

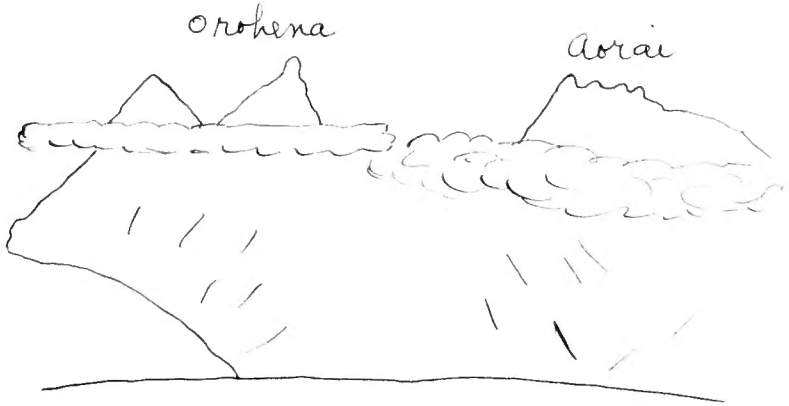
August 13

Rain following calm began last night and has continued well into the day. This being all ready to sail and anxious to

get into the field, and then to be becalmed is about as trying as any situation imaginable. But when in Polynesia schooners must be Polynesian; sailing on time would be too great a shock to Papeete, only mail boats doing that. Mount Aorae plants are not doing well, owing to my neglect and the total disregard of the sailors.

August 14

Left port this day at 12:10 P. M., after getting away from the wharf at about ten and laying at anchor two hours some few fathoms from shore. Tubuai vessel just entering the pass.



Jones and I changed blotters and stamped labels for same; then we set to work threading bird labels. The thread is almost twine,--linen and strong but very coarse and hard to get on large bodkin. In the evening saw a few Pterodroma rostrata,

magnificent big shearwaters, about the largest we have yet come across. A good stiff land breeze came up about four P. M. and is carrying us along at a good clip. They think it will last but thirty miles, but that is something and so much better than sticking around Papeete. One gets so awfully tired of that place in a month. I hope I shall never have to put in another full month there. The sea for mine!

August 15

Our breeze, a stiff trade, is still with us this morning after blowing steadily all night. Our ballast must be about right, for one hour we made eight knots by the wind, and the log this morning records eighty knots, which leaves but one hundred to go to reach Niau,--previously touched by Mr. Beck who found a yellow-headed kingfisher there. A young booby is the first bird observed this morning. Trade wind clouds about this morning; sun fairly bright most of the day.

The wind fell somewhat in early afternoon previous to gathering of the clouds at about 3:30. Leaden overcast sky the rest of the day with very light drizzles of rain. Several small white-breasted Pterodroma (Aestrelata) observed during the day. Was not able to remain in cabin more than an hour or so at a time while threading labels. Jones tied while I strung the thread. Changed blotters and numbered plants. Suspending bundles below boom of mainsail will dry them fairly well if we get

some bamboo aereators made. Reefed the mainsail at eight o'clock. Will be at land by daylight.

August 16

The wind is still with us this morning with an occasional squall. A complete rainbow at 6:30. Atoll of Niau sighted soon after daylight; a schooner is laying-to off it.

Came ashore at Niau about 9:30. The first game was a kingfisher from the village street. The native name is "Oteuteu". This is a slightly raised coral atoll. Two warblers soon afterwards appeared, one of which I obtained. I then left the trail and penetrated the bush. A kingfisher on a branch ahead was espied by the native boy. The dog fell back and quit us. Hearing doves calling, we approached, getting too close for the large shell. The dove flew through the brush, not allowing a wing shot. Later we obtained two and a few warblers.

Returned to cluster of huts for lunch. Found Jones hard at work collecting plants which are very numerous here. This atoll greatly resembles Henderson Island in the luxuriant growth about the rough blocks of weather-worn coral. Mosquitoes abominably thick, due, no doubt, to the numerous rain pools in the potted rocks.

After lunch I again penetrated jungle and obtained a blue reef heron which flushed from midst of jungle at a shot; also two doves, one being a well grown fledgling. A pair of kingfishers I found over in a coconut clearing. Warblers here and there. Mos-

quitoes everywhere. Lizards very numerous. Here near the lagoon is a hole dug beside the road, giving me a section of about one meter in depth. Twenty-five centimeters thick is a cap of hard chert-like rock. Below it is a common beach sand not yet cemented into rock. Above it I find casts of tridacton and blocks of coral. Everything resembles the present beach line below to such an extent that a detailed examination of many samples alone would prove just how recent this slight elevation is. In the interior are blocks perhaps three or four meters above the level of the island, with intervening spaces like the crevasse in any ordinary reef.

There is apparently no living reef on this island. I searched in vain for lithothamnium and corals. It appears to be old reef rock now dead and being weathered by the waves. Above it is a small beach of very coarse gravel and above that the air-weathered remains of what formerly was the reef, the highest rocks of which are about five meters above present sea level. Returned to ship at five P. M. with twenty-six birds.

August 17

With fair wind last night and light breeze off our starboard beam today we have succeeded in reaching Makatea at six o'clock. Here, then, we are at the type of an elevated atoll. Henderson was as typical, but is too remote from civilization to be considered as a type. As we approach from the east the island

appears very similar to Henderson, though somewhat higher. We moored to a buoy about 8:30. Tomorrow we hope to obtain some of the Rupi, blue pigeons (Globicera), which are supposed to be on the verge of extinction by food hunters. Rather calm sea.

August 18.

Came ashore this morning, and after getting permission Jones and I followed path to dwellings and then took railroad beyond until well out in natural bush. Sidetracked and commenced collecting. Two warblers were easily obtained. In fact, I had heard them singing from the offices to and through the village. Have called and been answered by both doves and pigeon. Am at present stalking the latter, but it is slow and tedious work. Louis was informed that they existed only at farther end of island and that very early morning was the only time to get them. I have heard at least two here within one-quarter of a mile of the village. Warblers are about but I am refraining from shooting in anticipation of the more important game. Pandanus is the predominant vegetation, with a great variety of other plants, however. Have counted at least five ferns. Mosses are very common; puro and other trees plentiful; introduced plants abundant; one orchid already found, and lobeliaoids numerous.

The formation as observed so far is what one would expect to find in an atoll where the lagoon was well filled with

coral knolls. Sheep blatting near me recall former days, and will perhaps ruin the bird calling. It seems very odd to hear these pigeons calling on one hand and the steam locomotive roaring on the other. I can see no disastrous effects of the sheep having barked any of these tropical trees. There is no grass, however, and I am wondering on what they feed. Have observed but one land crab so far, a little fellow in the abundant coral rocks which stand up everywhere one to four meters high.

Followed the calls, but was unable to stalk the birds until I arrived at an opening with cocomut trees growing in it. There I could hear birds on two sides, especially in some large trees on a mound above the clearing. At last I spied one bird perched on a branch of a cocomut tree, and I shot him. Three or four flushed from neighboring trees. Later obtained one of them and would have gotten a second shot on the wing but my footing was insecure. Called at length, but they would not return. At least four birds here besides the two obtained. Here the green doves were calling abundantly and I obtained two. Very few warblers present. After an hour or more of calling I returned past graveyard to railroad trail and joined Jones at lunch. He is doing well with plants and has secured considerable in the line of fossils also.

Starting out in search of warblers I ended up, after a maze of intricate coral seracs, at the phosphate works. The coral blocks are about as usual throughout the lagoon; the phosphate seemingly is

dirt-like, filling in the crevasses of the old lagoon bed. Fossils are rare in it, but are found in the walls of coral. This entire island is probably ten or fifteen percent. phosphate. That may be a high estimate, but certainly this bed is much higher in percentage. Caps of coral blocks rest upon the deposit unconformably; but a close study shows the blocks capping basic coral which forms the labyrinth in the interstices of which rest the phosphate deposits. Small nodules and coarse gravels of the phosphate are abundant. What was it? Dead fish in a lagoon supersaturated with lime? They say they have some fossil fish in the office.

On along the road and a trail to the edge of the island where is to be had a magnificent view of the sea,--apparently the east end. Off on the right the cliff makes a long bend, and along its face can be seen distinctly three series of sea caves, marking the stages of the island's uplift. One is but twenty feet or so above the present sea level; the second at least two-fifths of the way up the cliff; the third about seven-tenths up. The lower fringe is slightly protruding, with the second sea caves above it. The present fringing reef extends outward perhaps one hundred meters at its greatest extent. From this vantage point the crevasses can be plainly seen. The slope of the reef cannot be detected from here, but it must be sharp out beyond the breaking of the waves, and soon drops off into deep blue. There is no secondary shelf as was so evident at Henderson.

Noddy terns, plotus, and red-footed boobies and frigate-birds about occasionally. Not many other birds here, save white terns seen above trees below cliff where a small beach extends along the inner portion of the curve. The barometer records a little short of 250 feet here, which, with a correction of fifty feet at sea level this evening, makes about three hundred feet the altitude of the island. Shot some doves and a warbler while returning. Hastened to Rupi tree and called at length with no results, so commenced shooting warblers and doves which were plentiful. The dark Rupi was a young male; the old bird a female feeding young.

August 19

The "Cholita" arrived yesterday and leaves again this evening, so we arrived here at just the proper time to see Mrs. Beck off and get mail away in time to catch the Frisco-bound steamer. Louis and I came ashore to hunt this morning. Stopped a moment to see the gendarme, and then came on up to Rupi trees. Heard two calling off the trail at a distance, but could not get at them. Here is nothing but plenty of doves and lizards,--calling but not appearing.

Louis went off and did considerable shooting. I went on along this trail through a maze of coral blocks where fair footing was afforded about three or four meters below their summit. Swung about and got entangled in a labyrinthian mass where the crevasse was isolated by sharp barriers. Once a rock broke off beneath my foot and let me down. Returned and followed down trail to Mango trees

where a branch trail led off towards the habitat of birds heard yesterday and today. Following along it, I called doves and warblers in vain for several minutes. In fact, I fell off to sleep calling them. They do not seem very responsive. Hearing Rupi call, I went on. Approached to where I thought the bird was. Hearing wing flaps after calling an hour with no response, I decided it had flown.

Ate lunch. Shot some lizards. Then decided to move on. As I passed beneath a tree bearing berries, I heard once more that heavy unmistakable wingflap. Saw a bird too near for safe shooting, but let him have it with a tree branch cutting off half the shot. He dropped amidst a flutter of heavy wings. Several others flew off. A green dove next perched nearby. The auxiliary got him. Then appeared a second Rupi on the top of a tall dead tree trunk. Got him. While picking him up (both these were young birds) there came the gurgling coo of a male pigeon; got him, and one other bird departed. A warbler had something, apparently a lizard, and was picking it severely against the tree trunk. I got him, but could find no trace of the thing being eaten, so it remains but a guess. The auxiliary shot roused the last Rupi from neighboring trees, the flap of wings announcing its departure. Another green dove has arrived. Nothing more but a dove or two, so I went on in early.

The "Cholita" was just leaving as we reached the dock. Shots brought the boat our way. Jones has a good looking collection

of plant specimens for a beginner. He gets the idea well.

August 20

Did not feel energetic enough to go along with Jones to the village and the underground river. Evidently the fresh water drainage is into crevasse and then out through this underground stream, which is fresh, right to the beach.

August 21

Louis and I at the dock at five A. M. (half an hour late) and the Captain of the Post had just left. We found the road, however, from the instructions given by an old native woman where we left the village road. At the end of the wagon tracks I shot a booby, and a little later a green dove. As if aroused by this last shot a pigeon came flying over the tree tops. I dropped him well. We then got on a wrong trail and ended up in a blind at some orange trees. Could then hear pigeons on each side of us, so returned and found a real trail. Stopped to drink some coconut water and while so doing two pigeons coming from the woods alighted briefly in a neighboring coconut palm. As they took wing I called Louis to attention, but succeeded in dropping both myself. We then followed along the trail full of hope. But in spite of frequent calls heard neither of us saw another bird. Louis excelled on the warblers; I got more doves, having found a trail which led, no doubt, to good hunting

grounds where doves were numerous and pigeons calling almost all day. I came upon two trees in which red-footed boobies were nesting. Collected two birds, but did not feel like climbing so high for eggs.

Returned to dock to hear ship was sailing, so went down after lithothamnium rocks. Was able to get well out towards verge of fringing reef, but here it seems virtually dead on this upper surface which is covered with several seaweeds (collected by Jones) and barnacles. I broke off a few chunks of the best looking rock. On the windward side the fringing reef looks more colored with litho. Also collected from a dump where a channel is being blasted out of the coral what appeared to be mostly litho,--can say nothing as to its depth. After we got aboard the mooring was cast off and we set sail towards Rangiroa.

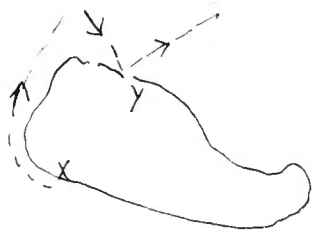
There is little doubt as to the former atoll condition of Makatea. The whole conformation of the upper elevated portion reveals the fact. Whence came the phosphate? This company has a concession for Niau where they claim the whole lagoon bed (it has no outlet and was fresh water prior to a hurricane sixty years ago which filled it with sea water) is of phosphate.

August 22 --Rangiroa

We had plenty of work for this morning and enough to keep Mr. Beck busy all day. At twelve we put out the boat, and Louis, Jones and I went ashore where the sooty terns were nesting. The colony was but a small one covering perhaps one hundred by two

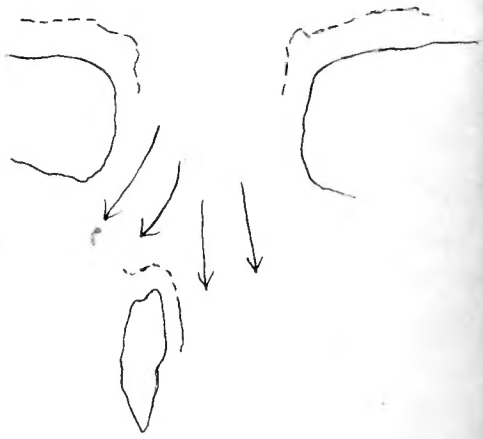
hundred meters. Birds fairly abundant. Eggs all badly incubated. Newly hatched young birds beneath parents, and those a day or two old beneath rocks, cocomut husks, bushes or anything affording shade. Collected about thirty old birds and a dozen young ones. Louis went on over to an islet well out in lagoon where he found a little indigo blue parakeet, and warblers. Beneath some cocomut trees and tall woods I obtained two green doves quite different in appearance from the Makatea bird, but very closely resembling the birds collected on last trip from lower end of the Tuamotu Archipelago. Warblers were also present here and they, too, seem quite different from the Makatea birds. Did not find many. Here also were the little white terns, of which two adults and three downy young were collected. On the low bushes on another edge of the motu the noddy terns were nesting in a few numbers. Collected two young and some old birds. Saw one tatler as we came ashore. Killed a curlew while wrapping the noddies. Apparently these indomitable winter tourists are down from their summer's nesting in Alaska.

August 23



Went into the east pass about noon, having worked up past the west end of atoll during the night. Mr. Beck, Louis and Jones ashore on village motu east of pass. I went in a little dory to motu beyond the pass. The pass is perhaps three hundred meters across, and carries a tremendous stream of

water at about three miles per hour today. Opposite the pass is a small coral knoll with a miniature reef facing the current of the pass. Here I collected three sample rocks of litho. The islet is very low, small and composed of coral blocks, with no vegetation. Here I obtained two blue ternlets and one gray-backed tern. We had a rather difficult pull to get across the current. Found a coconut tree with abundant drinking nuts in the grove on the end of the motu, and helped ourselves. Obtained a warbler there.



Proceeded along the motu inland wherever the brush would permit any decent progress, otherwise along lagoon shore. Obtained but five warblers. Heard but two doves, and got only a very distant shot at one of them. Heard nothing of the parakeet. Saw, but could not obtain, a white reef heron. Saw some rats about the size of the Polynesian rat. Missed both shots and the dog failed to catch any. Lizards were not plentiful, but I got one. Saw two tatlers along lagoon shore and obtained a blue reef heron while returning to the boat. A flock of gray-back terns on the islet in the pass tempted me to keep down that way instead of going up into pass before striking across. Obtained two birds at sea; did not stop because of lateness of hour and difficult rowing against wind and across current.

We left the harbor at about five, the engine making fair

headway against the stream. Saw a few blue ternlets and lesser noddies fishing along the tide rip. Saw fish there while crossing in boat. Hooked a fish, but pulled hook out.

August 24

Skinned birds until noon. A severe attack of acute indigestion put me on my bunk as the rest went ashore. Warblers, doves, tatlers, curlew, and yellow-billed terns.

August 25

Spent the day skinning birds and overlooking plants. Jones' work is perfectly satisfactory to me.

August 26--Ahii

Land was nearby at daylight. As we landed I got out and broke off two chunks of the lithothamnium ridge which edges the coral shalf lagoonlet. The latter is very shallow, but close to a hundred feet in width. Along the outer rim was found a sea-urchin whose spines are but flattened plates,--the first ones I have observed. Berries plentiful and a dove heard at landing place. Proceeding along the island for an hour netted nothing save a white tern. Two or three small flocks of lesser noddies were seen flying over trees, always on opposite side from me. Along the lagoon shore (which is terribly indented with bays and has the bush growing near the water so that traveling is poor) yellow-billed terns and a heron were

observed but not obtained.

At last a lesser noddy was killed on the ocean side of the island. Immediately afterwards a dove answered my calling and was noticed within gunshot. The dog retrieved both birds. He has been working through the bush very energetically all morning, but has not brought to light the object of his excitement.

In the next patch of woods two warblers were called, one escaping. Here also three doves (one a young bird) were called and obtained. The young bird came up without making the slightest noise and was too close for auxiliary shooting when first observed. One of the older birds answered from a distance and called three times as he approached. The young bird remained rather unconcernedly in the low branches of a tree while the dog rummaged around below him. The two old birds arrived together from different directions. As the one saw the other approach he raised up to his full height and fluffed out all his feathers so as to appear twice his normal size. Shooting him did not scare the other bird away. Mosquitoes are terribly thick, though not so bad as at Rangiroa. Lizards are scarce and wary here.

Outside this place I picked up four lesser noddy terns as they flew down the land. As it was about ten, I struck out for the boat. Seeing yellow-billed terns upon the verge of the reef I crossed the almost dry flat to get a shot at them. Failed. Was so interested in the reef that I struck down it, risking salt water on my shoes. This scientific curiosity is a costly thing where footwear is concerned. The broad tidal flat is indeed a flat here. It was

practically dry save for some very shallow puddles upon the few depressions. An automobile could have rambled over it at a fair speed clear down to the boat without much trouble. The inner portion was bare save for a brownish coating of litho. The outer third was a mass of lithoes, with any number of small tridactons and a few urchins and holothurians. Seaweeds were entirely absent save for the corallines and lithoes, phacenalias etc. Along the edge of the reef was a raised ridge of living lithoes about fifteen or twenty centimeters above the tidal flat. This was frequently cut by niches or wide crevasses which penetrated the reef some five or ten meters. The tridactons closed as one approached within two meters of them and squirted water a meter or more into the air as they did so, much to the annoyance of the dog. The ocean was quite calm and lacked the swells usually accompanying such weather. The water was about thirty centimeters below the level of the tidal flat, but the swells raised just over the verge.

For about five meters from the verge the reef was unmistakably lithothamnium with many intricate interstices and borings of mollusks etc. cutting it. Through most of these the sea welled up but made no spurts. In some places the ribbed yellow coral spread in patches a meter or more across the surface and many encrusting corals vied with the lithoes for a foothold. At the boat I went out to the very verge and collected two more small pieces from the rock. Above the flat the land was less than a meter higher and quite even, being composed of conglomerated coral blocks. Among them were many

distinctly lithothamnium.

The gravel beaches were not common and were less than a meter above the conglomerate where they did occur. Throughout the vegetated portion the finer lagoon sands seemed to predominate. The lagoon shore was decidedly cut by channels extending well across the conglomerate, but only once reaching the tidal flat in about two miles.

Along the reef I flushed a heron, tatlers, yellow-billed and lesser noddy terns. Obtained two yellow-bills and a white tern. Louis and Jones had gone aboard. Beck and I off at eleven. Beck skinned out thirty birds in six hours, including dinner time, making twenty-eight in five hours and fifteen minutes.

August 27--Takaroa

Had a fairly stiff breeze into which we headed at about four or five knots, arriving off Takaroa late in the evening.

August 28

Put in towards pass early this morning. Put out the boat at least a quarter of a mile out and had about a twenty-five minute row in. Secured a gasoline launch, which launched but doesn't gasoline. We are now drifting in the narrow channel, having just barely avoided the rocks on one side and now drifting over to the other. There is always some amusement in going out with local skiffs like this.

The pass here is on the southwest side of the atoll. The dock is constructed along the steep-to edge of the pass, which is a very elongated channel with coral dikes but slightly submerged extending at least a quarter of a mile into the lagoon to windward where the south arm curves around the end of the pass, an entrance being effected on the north. There a very choppy tide-rip reveals the fact that considerable current enters and leaves at that gap.

On my return I will try to land on the reef, as I hope also to be able to do on one of the small coral knolls out in the lagoon. We have already passed two, and as we approach the southern shore smaller knolls appear. These isolated patches of coral should be accounted for in some manner,--but how? If growth from the lagoon bottom, why not more or larger patches?

We land at east end of a long motu, the boat to pick us up at other end; which they did shortly after eleven, after they had run back to the village and returned. Neither doves nor warblers heard or seen. Not a tern observed all day.

We are now sailing across the lagoon in search of something with feathers on. Three tatlers (two obtained) and three reef herons

(all missed, two white) were the only birds seen all morning. Saw but one small lizard and could not catch him. The boys say they eat all the birds they can catch. This then accounts for there being not even terns present. There are indeed several coral knolls throughout this lagoon. I have had the boys cruise as closely as they dared to them, and can see, besides a multitude of corals, tridacton, etc., patches of lithothammium which certainly form no small part of the shelves.

I had the boys anchor off one of the knolls and got off to collect rocks. Found a Codium, Caulerpa, and a globular green with many small reds in amongst the Codium roots. Corals there were with lithothammium choking them off and forming bridges between the chunks of coral,--treacherous bridges of soft limestone which broke repeatedly underneath my feet. Collected some of the representative forms from this leeward side of the knoll. On the windward were living corals and litho, but not the beds of seaweeds. A rather wide shelf with nothing much but tridactons growing in it.

We are now approaching a group of anchored canoes where the boys are diving for shells. One boy remained below the water for one minute and thirty seconds, another for one minute and ten seconds in ten fathoms. They use lead weights to get down. Number one went down seven minutes after the first dive (rest of five and a half) and remained down one minute and fifty seconds. The others did no diving as we sailed past. There is a small temporary village here where they are diving, and the newly erected huts are very neat in

appearance. But twelve canoes are out today. It must be quite a thrilling sight when a few hundred, or, as Louis says, three thousand are diving. They yell just before going under. The weight is held between the big and second toes, taking them down feet first. They have a net with the weight and into it they put the shells collected. This is drawn up after they have dried themselves with a towel hanging on the outrigger.

We have now sailed along shore some twenty odd minutes without observing a single bird of any kind. With two boys at their horns (additions to our excursion upon their morning return trip to dock) we go along to shore for all the world like a band wagon parading the village street to announce a dance in the town amusement hall. A good squall is approaching. Saw one yellow-billed tern along the reef.

As we returned to the village the tide was going out of the pass. Entering that coral-diked channel at right angles it boiled around in great shape, creating fearful looking eddies, tide-rips, and swirls. A wreck there would tax one's powers of swimming. I doubt if the strongest of swimmers could manipulate against those sucking maelstroms. At the village we had a wait of an hour or so for the boat. Met the Mormon Elder, Talmadge B. Burbridge of Salt Lake City, and had a very enjoyable time with him. It feels good to meet someone from home,--someone who will return home many a year before I will and may bear a message to my folks.

Had about a mile row just off the reef to the anchorage at the southern end of the incurved atoll,--an odd reef in that the wide tidal flat, well over one hundred meters, was very level and regular, with very slight depressions on its surface and a very few insignificant notches in its edge. The edge fell off so gently that for the greater distance no opportunity to break off rocks appeared. Towards the anchorage, however, a slight ridge appeared along the verge. I landed and secured several chunks of litho from the verge of the reef. The flat was quite barren of life save the litho.

August 29 -- Takapoto

Jones and I went ashore at seven to collect and hike, so the Captain says, about five miles down shore to the place where the rest will land. The reef here greatly resembles that off which we anchored last night at Takaroa, a tidal flat fully one hundred paces wide, with but slight elevations along the verge. Few notches and few depressions. A coating of corallines covers the outer portion of the flat, giving way to lithothamnium where the waves strike. High water prevented getting out very far. An idea of the smoothness of the reef is gained by the fact that knobs were scarce and crevices more scarce, making it necessary to hunt at length before good representative specimens could be obtained. A few small niggerheads were seen as we sailed along this leeward shore. They were well in towards the gravel beach which rises

almost directly from the tidal flat. At its base is found the customary conglomerate about one meter thick. Alternate air and water seem to form the concrete between highest high tide and the flat. Storms break this layer off and form niggerheads of it.

Cocomut palms somewhat well cared for greeted our approach to the brush. The land in patches is well cleared, the well planted trees are growing splendidly and bearing nuts in quantities that can be reached by hand. I crossed one square of patch of young trees which cornered upon a grove of older ones extending to the lagoon shore. There is considerable sand mixed in with the coral block across the land, and near the lagoon the sand predominates, with a tidal flat of silt extending more than a hundred meters lagoonward where a small fringing reef exists. In the sand of the beach was a well of very decent water. The dog drank a good draught of it. One warbler was obtained from a patch of uncleared brush adjoining a grove of palms. A rooster was heard to crow. It is said that chickens have gone wild on some of these atolls. A tatler was on the lagoon tidal flat. No response to dove calling. Lizards noticed, but none yet caught.

Here is found that tree that Dr. Setchel found at Rose Atoll (Samoan group), and inquired about of me. We found it most abundant at Vanavana where it formed large groves. Clearing for planting has thinned it out here, but it is not infrequent. This tree measures eight meters in circumference over all,--4.5 meters circumference around largest trunk breast high. The tree rapidly dwindles

to small branches. Up in them I found the old nests of lesser noddy terns, and beside the nest one small cluster of buds of the tree's flower,--a very rare find. The tree stands well above the cocomuts here, at least fifteen meters high. Also shaved some lichen covered bark from the bowl. Three more warblers have been collected; they are rather scarce. White terns observed above trees, but not yet obtained.

I am fortunate to find a shelter whenever the showers strike. The wind is high today and squalls frequent,--heavy, wet downpours. Meandering back and forth from shore to shore has resulted in finding but a few more warblers. While along the lagoon shore one trip I stripped down--or up--and waded out to the fringing reef. There a Caulerpa and red algae were found in the crevices, with a slimy green on the upper surface of the litho, of which the bulk of the reef is formed. Broke off some specimens in spite of waves and water. On the tidal flat nearest the beach was a pinkish white scum which appears to be algous in nature. Saw a yellow-billed tern down shore a way, and later one above the ocean reef.

The reef where we went off was more notched and cut up by crevasses than where I was landed. Here also the tidal flat was more "pot-holed". Live encrusting corals were growing in the pools which were rather shallow. Coralline algae coated the verge of the reef; tridacton rather scarce; mollusks not overly abundant; urchins scarce. None of the disc-spined urchins have been observed

since Ahii. During the suck-back of the waves I succeeded in breaking off some good bits of litho from about one meter below the verge of the reef. Little difference noticed from that at the verge. The boat was moored off an overhanging shelf of mostly litho from which another sample was taken.

Warblers with one white heron and some tatlers completed our bag. Louis and the Captain reported having heard the rail, while Mr. Beck saw one, but his gun failed to fire,--typical rail luck! There's work for our real stop at that island,--work and patience. We certainly missed a splendid breeze for sailing by stopping here, though we had a little of it left this evening,--enough to make one feel a bit unsteady after we got beyond the lee of the land. I am about of the opinion that my so called indigestion is but a mild chronic seasickness. Active work seems impossible, and passive employment barely endurable.

August 30

Passed a sleepless night on bunk, squalls preventing attempting relief on deck. Had about an hour's sleep after four. Tried to skin birds this morning, but could not turn out a warbler in less than half an hour, and was so unnerved that I pulled the head clear off the last tatler attempted. One other tatler had the tail skin badly shot and so lost his tail. An hour's sleep before lunch helped out somewhat.

Two fish were caught trolling yesterday,--one very long

slender fellow (barracuda?), and one small tuna (?), both a meter in length. The latter was exceptionally well prepared for lunch. Wrapped litho specimens of Rangiroa.

August 31--Tikei

We landed this morning before seven opposite a small cluster of old native huts. We found a clearing from reef over the two hundred meters of tidal flat,--a pathway chipped off so as to be smooth. Niggerheads of considerable size are scattered all along this flat. A tidal pool near the beach is filled with orange colored scum. The island is not an atoll, though it appears to have once been one, and the lagoon has subsequently filled with rather fine sand. In one place where storm washes still flood over the flat are two small pools, less than one hundred meters in length and not ten wide. There are small fish in them. These appear to be the last remnant of any lagoon. Elkhorn coral grew in their central point, separating the two pools. It is now dead and coated with pond scum. An algae was floating in the pools. Here a curlew flushed, but I failed miserably in trying to shoot him. Rail were reported here. Louis and Mr. Beck claim to have seen one each and to have heard others. I did not hear any. Was too miserable to talk with them anyway until past two o'clock, when I revived enough to return to shacks. Obtained some noddies and a tatler going in. Found the yellow-trunked tree very abundantly in bloom here, and so did Jones who gets nearly everything.

Down at the boat the bo's'n had collected a very average representation of the litho. While awaiting Mr. Beck's arrival we scraped considerable seaweed off the rocks, including Codium, Caulerpa, bluish-globed brittle, a brown thallus, and corallines. The Codium was found abundantly in one place. The Caulerpa was fairly common. The brown thallus and the bluish-globed brittle was common all along this portion of the reef. Tridactons, mollusks, urchins and holothurians very scarce here. It was rather strikingly noticeable both to Jones and myself on different windward sides of the island that the sea was well up on the tidal flat, while here we walked dry shod to the boat. Nor was the flat so extensive on the other sides, and it was more cut with channels and more notched. Here it dropped off into deep water very rapidly to about three fathoms, then a shelf extended somewhat seaward. The verge was really overhanging a little. Everyone ashore reports that no water was observed within the beach other than the two small pools mentioned. Here then is an odd Tuamotu one which cannot be colored blue by Darwin; Niau would call for distinction also. These atolls may seem similar, but they differ considerably.

Young birds were obtained from lesser and noddies, and eggs from lesser noddies and white terns by Louis and Mr. Beck. I felt anything but monkey-like today, so did no tree climbing. Saw a warbler carrying a worm, but she fed it to a large bird.

Bilious attacks again this evening. Unless this trouble can be controlled I'm likely to have to quit the sea,--a measure I would hate to be forced to, for nothing ever satisfied me more than the work I am now engaged in; but if I cannot do justice to the job (and as a sick man I cannot) I must resign to fate.

September 1

Finished the birds today shortly after lunch. An island without boobies, tropics or frigates furnishes nothing that will last more than half a day. In the afternoon my biliousness was very severe.

September 2

Strung a thousand labels today with Jones tying them. Small squalls of drizzling rain, but not enough to furnish a good bath. Those who tried it only shivered in the cold and hardly got wet. Last night at midnight I watched a young booby soaring about the masthead at considerable length. A gibbous waxing moon and large fleecy clouds furnished ideal conditions for seeing a bird flying. Several young boobies were also observed yesterday and today. Sooty terns pass us frequently in small flocks. No shearwaters have been observed for some time, except one by Mr. Beck.

September 3

Thinking today was Saturday I started to string labels, but was soon reminded of the day by the natives who are very strict in observing the Sabbath. At Takaroa I talked with the Mormon missionary concerning the natives and religion. He considers them a very religious people, but admits that sexual morality as Christianity knows it is not considered in their religion. As regards the "word of wisdom", "tea, coffee, liquor and tobacco we despise", a part of the Mormon creed he says they are scrupulous about observing. That is more conscientiousness than I gave them credit for.

A red-tailed tropic bird was about the ship this morning. The papers we use to wrap birds and press plants are filled with radio phone information; magazines have long articles concerning it; I am wondering how much we could hear from this region with a reasonably priced receiver. It would help some to be able to hear the latest in music from California. The possibilities of the radio on such an expedition as this are decidedly great. The receiver first, and perhaps later on an equipment for sending messages which might come in handy in case of accident. We actually have a water-barrel on deck this trip, but there's no grub ready in case of accident. Of course this ship will not sink, nor will it strike a reef.

September 4

In the late afternoon a flock of fishing birds was observed,--terns, boobies and frigates being recognized. In the evening two small Pterodroma passed near the ship; one was white breasted, the other all dark brown or black. Both were smaller than P. parvirostris. A yellow-billed tropic about the ship during the day, but could not get a shot at him. Sooty and white terns occasionally seen.

September 5

A beautiful clear morning and no stomach trouble either. Two sooty terns observed at sunrise. Three yellow-billed tropics about the masthead this morning at one time. A single and a pair had previously visited us. More work on labels, Jones at the plant blotters. P. obscura and one F. albigularis observed in the evening with boobies and terns in fishing flocks. Frigates and both tropics observed during the day. It cheers one up to be getting into bird territory again.

September 6--Huapu

Packed away all plants that were sufficiently dry today. Litho not dry on account of shower last night. As we approached Huapu about three P. M. our trolling spinner afforded great amusement because of half a dozen young plotus boobies diving after it. We anchored off Bay. I remained aboard and did up a much

needed wash. Terns plentiful, including the little blue tern.

The shore party heard warblers and doves about the village. Mr. Beck out in boat this evening killing a few blue ternlets, lesser noddies and a booby. Drifted off anchorage, so lay-to for the night.

September 7

Spent a rather sleepless night, and so feel rocky this morning. Ashore and hunting, but left the auxiliary barrel on the ship,--with warblers, flycatchers, parakeets and possibly rail. Shot some warblers along the road above village. The dog is quite essential for this long range work. White terns are flying above the ironwood trees and ridges and in the heads of the valleys. Few were low enough for shooting, and there was little response to calling. Doves flying aloft across the valley and over the ridges as they did in Hivaoa and as they do not in the Society group. I killed three of them, but they fell too far down in the valleys for the dog to find them, save one. They, too, are very unresponsive to calling. Parakeets squeaking above as they fly across from ridge to ridge. They do respond a little and so I have obtained about four in beautiful varieties of juvenile plumage. I have seen one white one and have spent an hour trying to get him, but the trees are always too thick. During my calling one blue bird alighted near me and remained there quietly observing me for many mimutes. Parakeets are rather numerous here. Mosquitoes terribly irritable.

Three flycatchers flew overhead following a shot at a warbler coming up trail. I got one of them. Later obtained a brown young bird and two more black and white. They are more seclusive than the warblers. They burst forth in a merry clatter very near to one in the dense woods, while parakeets squeak overhead; warblers whistle nearby and doves coo in the distance. A parakeet from the beautiful red-flowered gum tree which is here so abundant. A shot at the albino. A young flycatcher and a shot at a swift resulted from ascending to a grass-covered shoulder above the tree-filled ravine. My hat blew over a small ledge and the dog kindly retrieved it for me. He has been working beautifully today since I drove back the native hounds above the village.

Returned to trail across a small stream blue with clay in suspension. Lunched with Jones. While eating, a young warbler alighting at good range fell in the trail. The dog quit eating sardines and retrieved the bird. The shot aroused parakeets about us and the white one alighted on a branch in plain view and good range. I got him,--a gorgeous bird with just the daintiest hints of color reflected from the feathers, a faint copper green and a delicate pink. The boy says they are common.

I cross the ravine to the ironwood slope where white terns are fluttering about and doves are cooing. I shoot a white tern and parakeets fly out of trees and a swift comes along above them. I fail to get either. The woods here are well covered about the ground with ferns and grass, but no sounds of rail. The little

white tern is the commonest bird about here, or at least the most in evidence.

Warbler	Komako
Flycatcher	Patiotio
Brown flycatcher	Kokohuia
Green dove	Kukupa
Parakeet	Pihiti
Neglected shearwater	Koputu
Swift	Kopekapeka
Lesser noddy	Koio
Blue ternlet	Kaka
Red booby	Lauhee
Common booby	Karena
White tern	Manake
Gray-back tern	Kaaka

September 8

Beck and Jones around to Motu Taki after pictures, plants and birds. I remained aboard skinning yesterday's catch. In the afternoon Louis and I took the little boat and went along the shore, picking up two tatlers and observing coralline and litho coating of the rocks. No sign of fringing reef here. Very little coral on the beach here.

Beck and party returned at three-thirty with gray-back terns, plotus booby, and a minor grigate. I went out in boat to shoot blue

ternlets but only picked up three stragglers, the flock being two miles farther out than we got. Obtained half a dozen kaveka (sooty tern) from the passing flocks of half a dozen or so each. They were coming up wind and heading for the islet beyond. Plotus boobies came in mostly in pairs,--none within range. Shot some young red-footed boobies (Sula piscator); also noddies (Anous stolidus pileatus) and lesser noddies (Megalopterus melanogenys) and one flying juvenile sooty.

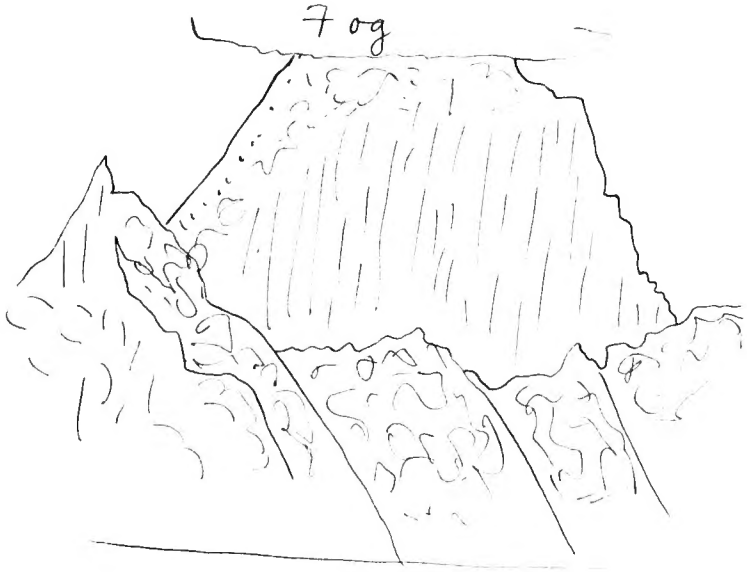
September 9

Jones and I ashore for the forenoon. Louis out after goats with boat. Took the trail to the left down which I came Thursday and followed it on up into canyon where maupi groves, candlenut, hibiscus, banyan-like tree, and ironwood form woody patches. Obtained several flycatchers, a parakeet, warblers and doves. It was very noticeable how numerous the warblers were from the village up to the forks of the stream. Then came a decided lull in their music while parakeets led the field with their squealing, and doves could be heard from the ridges. Occasionally as one penetrated the forest glades the perky little "Serx-sixy" of the flycatcher broke the tense solitude of these deep bowers. They are rather secretive, however, and considerable calling is necessary to entice them within view.

Feeling that I needed a little real exertion I essayed to

reach the ridge from the head of a ravine. Found some interesting mosses and lichens on the rocks in the ravine. Got my exercise by following a goat trail up through and under the tall coarse grass. Slipt back several yards occasionally. Reached the summit and obtained a swiftlet for my efforts. This ridge culminates at 2,200 feet, where the summit is capped by a barricade of rock as the so-called forts of Rapa. There is but the one long oblong cap with no other form save terracing below it. A neglected shearwater passed beyond range. Noddies in pairs flying about, but not numerous. A warbler in the grass behind me, but the new auxiliary barrel is too large for my gun.

This island is conspicuously old in regards to weathering. There are two decidedly typical volcanic necks on either side of this point,--one plainly visible from the village. The highest peak, too, resembles in all outward appearances that style of peak.



The vegetation here is decidedly in zones, or perhaps better termed "patches". The lower ridges to windward are almost barren,rock exposures being very frequent. Above about 1,500 feet the ironwood begins to take possession of them and continues to about 1,800 feet. But it shares a great portion of the side slopes with the tall rank grass. Fern-brakes are not common but do occur here. Pandanus is rather rare in these hills, but is to be found down in the valleys. The ridges reveal long weathering by their irregularities and the same must be placed upon the broad ⌣ valleys, the lower extremity of which is invariably drowned. Streams are small and not abundant. Cocomuts grow up to one thousand feet altitude. There are not very many of them anywhere here, but the nuts are large and full of meat. Bread-fruit grows all through the valleys. Guava is here, but not as abundantly as at Hivaoa.

Returned down the ridge to the trail and followed it down. Jones was above the valley woods collecting. Obtained a parakeet and dove or two on way down, but soon ran out of shells. Then the flycatchers showed up in numbers. Returned to ship and after a bath skinned birds until nine P. M.

September 10

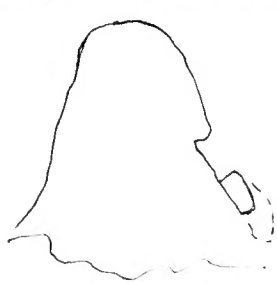
An hour before breakfast finished the two boobies left over from yesterday. After breakfast I endeavored to mount a green dove for the Captain. Took two hours at it, and with Louis'

efficient help (he had observed Mr. Beck at it) succeeded in making a bird of it, except that he looks badly scared and about ready to leave his perch in hurried flight. However, it isn't so bad for the third attempt, the other two being ten years ago come March. Painted bill, eyes and feet of a dove and the white parakeet, applying the paint directly upon the mounted bird and the beak of the parakeet for an experiment.

September 11

Ashore this morning with Jones and Martini (a sailor) to assail Mona Potoko. A native boy went with us for a ways. He says the owner of the valley camped a week up here and never succeeded in reaching the summit. Warblers as abundant as usual. Parakeets and white terns also plentiful. A few doves, but no flycatchers yet observed. Our native left us at about three hundred feet elevation. We followed up the trails (horses and cattle ranging the hills make many conflicting paths) leading around the pinnacle to the left and lunched near its base at an elevation of 1,400 feet. Yellow-billed tropic birds and noddy terns can be heard flying about the inverted cone of hard rock.

Climbing a large banyan-like tree, I reconnoitered our route. From there I could see swiftlets flying about below an overhanging rock. This overhang is four or five meters in depth, and below it on the summit of the talus rest huge blocks

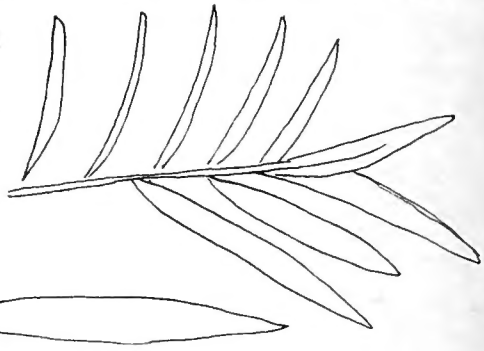


which have peeled off the cone and slipped down, leaving the overhang. Along the ridge on which we lunched are several enormous boulders, all of which appear to have been at one time in the bed of a stream. Water action alone could have grooved them in the manner they are now carved. How come that they are now the highest portions of a ridge with deep ravines on either side? There are volumes of old legends in these hills,--how ancient they are is entirely problematic. They are no doubt much older than Tahiti and even Moorea.

The flycatcher has been very prominent along these purau woods. The banyan trees are apparently rendezvous of doves and parakeets about. At least a dozen were flying about one tree. Warblers were not heard through the cool shady woods, but occur in the hibiscus (purau) above the ravine woods.

We have evidently entered a new zone of mosses, lichens and ferns here. Pandanus and hibiscus are the predominating trees. Four hundred feet up a densely purau forested slope approaching 45° where we get a view of the ridges leading towards Mona Potoko. We are heading for the ridge northeast of the pinnacle which is so prominent from the anchorage. Thence we have the jagged peak on the left of the sketch on page 53 to circumvent. The saddle between it and the main peak is flanked by a horn of steep rock. If we can get around or over that we should find little difficulty in reaching the fog-enveloped summit. What it is like we cannot see.

I can see black birds flying about the peaks and can hear shearwaters which sound like the neglected. We have just entered the zone of the climbing pandanus ("ieie"). Pandanus and hibiscus still dominate the forest, with a "barrel" stemmed fern predominant in the undergrowth. Ground well covered with a grass having long lateral leaves alternating. The flycatchers are practically the only land birds here, but I can hear a warbler still above. One ridge on this side is covered with the tall coarse grass, but generally the vegetation is more of a moist-habitat variety. The others cut down into the ravine to fill the canteens while I hunt and write and cut trail on up the ridge to the very edge of the pinnacle, but a dense growth of "ieie" stops us from reaching the ridge.



We camp in the upper edge of the purau at 1,875 feet. The thermometer at six P. M. was 68°; at seven P. M., 67° F. Here the shearwaters can be seen soaring about the pinnacle, as many as twelve being visible at one time. Others are about the jagged peak above this ridge and more heard from the fog bank above there. They may all be neglected, but the calls sounded strangely like the parvirostris (?) of Ducie. The pinnacle with its great blocks of warts overhanging below and projecting above forms ideal and safe nesting places for rock-dwelling shearwaters. I essayed to reach the ridge without my pack, but found the "ieie" too much for me.

For dinner tonight we had four broiled doves, very delicious eating when plucked and well cooked. Noddy terns about the rocks but not in any profusion.

Shortly before 6:30 the obscura shearwaters commenced calling and continued for about half an hour. There were not very many of them, judging from the sounds. Towards evening, the warblers vied with one another at vesper songs, while doves were cooing their twilight prayer, and the little blue parakeet was shrilly squeaking intercessions, and perky-derky flycatchers "Glory halleluiahed". Once again obscura calls, a familiar sound and one heard in all mountains here where rocky cliffs abound.

Was somewhat disgusted with myself upon making camp to discover that I had failed--another obscura--to bring along the arsenic. I skinned out two black flycatchers, cleaning them very thoroughly and drying well with cornmeal. Is the arsenic essential? Fortunately no very valuable birds were obtained, nor enough common ones to warrant sending the native down with them tomorrow as planned. We will need him along in our attempt to reach the summit. There is going to be some very interesting climbing in the morning. We will ascend until about one o'clock or two, and then return to camp. If necessary we will make a second attempt Wednesday. While we are up here we will exert every effort to reach the summit.

A few straggling obscura came in later than seven o'clock. No neglected heard after 6:30 P. M. Once during the night I thought

I heard a wedge-tail. At eleven o'clock (moonrise) the doves set up a loud cooing, and a less noisy performance about two. They commenced the morning mass at five, when the warblers and fly-catchers also were heard. At 4:10 the obscura were very noisy, but at 5:30 not a sound of them; a few neglected heard. The noddy terns were noisy considerably after seven until we went to sleep. Parakeets about at 5:30 A. M. At six all land birds were calling, but no sea birds save little white ternlet.

Temperature at 12:00 P. M., 67° F.

BOOK XXXI

Second Cruise of the 'France'

to

Huapu, Nukuhiva,

(Marquesas)

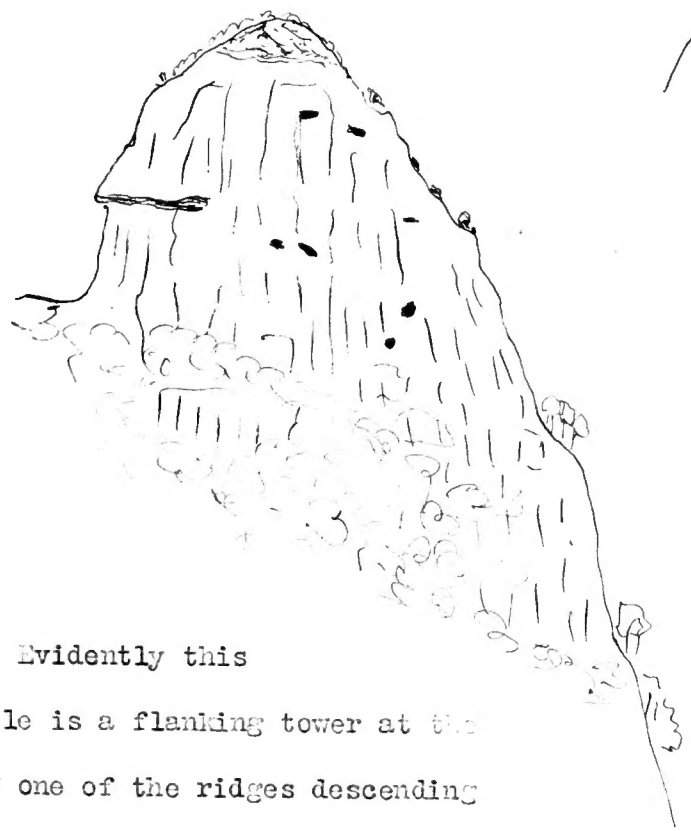
September 12—October 2, 1922.

September 12

Temperature at 6:00 A. M., 69° F. Barometer 1,900 feet. We got started at seven after a good breakfast, Martini having cut trail while we prepared breakfast. We hold our elevation and follow across the ravine head, hoping to strike water without descending. Heavy growth of "ieie" with which we will have to contend for a

thousand feet or more. Banyan(?) and candlenut trees here; also some beds of bananas. Flycatchers seem more abundant here than lower down; parakeets less common, and doves and warblers also less so. White terns about as usual. Noddies, yellow-billed tropic, and neglected shearwaters about the pinnacle this morning. They have ample nesting room on ledges of that sugar loaf.

The nearness gives to the following sketch too much of a dome shape; it is more conical.



Evidently this pinnacle is a flanking tower at the end of one of the ridges descending from the high mountain peak. Off to the westward stands another pinnacle in a similar position. It is higher than this, but not

so conical. No water here, so Martini has struck down ravine to fill the canteens and buckets. Jones and I assail the ridge up ravine. Today is going to be more of a course mapping than real climbing. Tomorrow we may be able with the help of what trail we cut and experience obtained today to make the summit. It is well that we kept the native, for we'll have more to do to reach the summit than we two can do while collecting plants and watching birds. Bananas are growing here, but no fei, which leads one to doubt whether fei are indigenous to these isles. Are the bananas? We will have to collect some. The ravine head slopes at about 45°. Ferns, grass, some "ieie" and occasional trees are here.

We reach the knife-ridge bracing this pinnacle at 2,250 feet. Found a few tree ferns at 2,200 feet. Lycopodium, new mosses, broad-leaved ferns and new shrubs here. We have ahead of us a stretch of knife-edge about one foot wide in places and covered with shaky moss beds, sheer drop for a few yards, then widening out to perhaps fifty or a hundred feet thick at one or more hundred feet below,--not quite thin enough to tremble in the wind. Jones, who was contemplating scaling Orohena, looks at it and decides not to go on to the summit. Faint heart ne'er scaled precipitous peaks. Martini is a second Taufai,--an old Tahitian and a dandy. He worked around a large rock, refusing the encouragement of the line.

The other side, or east of the pinnacle, is even steeper than the west side. I hope to get a good photograph of it from

above. It rises three or four hundred feet above this bracing ridge, and is more than a thousand feet high on the face towards the bay. Martini and I plan to go on up this ridge to look over the real situation where the two rocky precipices must be circumvented. All birds formerly recorded are here about as prominent as usual. Yellow-billed tropics flying about many of the cliffs visible from here. Still some neglected shearwaters about this pinnacle. All our efforts today have been in vain,--and most of them since yesterday noon. There is one feasible route into the fog,--by holding to the main valley and following the third ridge from the pinnacle. If nothing else intervenes that route should be feasible. What to do, for we have hardly enough grub now to make that effort. In fact, the glasses reveal a trail following up that very ridge, and evidence of former burning of the brush along it. It will get us this high without effort and then a little cutting should take us into the fog, where all is guess work save for my distant view last week when the ridge we make there looked feasible.

We are returning to camp down the first ridge, along which swifts were observed just below the rocky peak. Flycatchers, parakeets and warblers still here,--no doves heard for some time though they are no doubt here for I saw several cross the ridge higher than this. Ferns of various sorts, tree, barrel, basket, broadleaf, fronds and scattered fronds, broad-fingered and very primate fronds

are here. Grass and moss form ground cover. The native has been continuously cutting trail through heavy brush since before six this morning. No wonder he complains of a sore arm! Well, there's more to cut ere we reach camp.

At the upper edge of the knife-ridge we came to a small abrupt drop of fifteen feet. I stripped of bundles and went over with the cinet about a tree above. Nothing to it! Martini let down the paraphernalia, and the dog then came over himself. Then we were upon the large bouldered summit of the talus of the jagged peak. Around this we worked until the foregoing observations could be made. The tree fern becomes more abundant, but is nothing like the growths in Tahiti. Mosses, lichens and liverworts upon the ground and covering the boulders. Nothing especially interesting in trees save that the hibiscus comes up here but no pandanus.

We swing over towards camp, entering the ravine at 2,500 feet. A beautiful view of the pinnacle, so I tried for a picture. Barrel ferns very abundant down the ravine, with "ieie", the ava-like plant and a shrub with catkins and a three ribbed leaf. The chief note of interest this evening is that Martini claims to have seen a white parakeet, swearing he did not mistake a white tern for it. Doves calling abundantly all evening, but I had no pep for hunting.

September 13

Obscura commenced calling at 6:30 P. M. and called

occasionally for about an hour and a half. In the morning they started at 4:30 and called until just before daylight, when warblers, flycatchers and doves set up their calling.

We broke camp this morning and followed down trail until we reached water at 1,500 feet. There I decided to let the others take everything back to ship while I hunted birds. Starting out to hunt, I decided to go and look at the trail we thought we saw yesterday. Held my altitude until reached main stream, then followed up it to 2,000 feet. There ascended the ridge which affords the only feasible ascent of the mountain.

Am now on it at 2,350 feet, but there is no definite trail. The brush, however, is very low,--barely more than knee deep. The morning is yet young, so I'm going on up hill a ways farther. The ridge is steep in places with slight exposures of reddish-brown decomposed lava. Vegetation consists of low ferns, mosses, low grasses, Lycopodium, and a low variety of "ieie". One shrub of Tiare apetahi, or a close relative, here has dark purple blossoms. Over on the knife-ridge they were white. Here are whole ridges covered with "ieie" almost exclusively for two or four hundred feet. From 2,200 to 2,700 feet it is the dominating plant. The "ieie" (Freginetia) here appears to be specifically different from that at yesterday's camp. The stems of this are 1-2 centimeters in diameter, while that was 2-4 centimeters. I am just about level with the summit of the pinnacle. Our camp Monday noon was just below its south

face, which would give that cliff at least fifteen hundred feet. Occasionally a dove or parakeet flies by me. They evidently come well up against the fog bank, which appears to be at about this altitude on the windward side, here being two or three hundred feet higher. Here commences also a maiden-hair fern.

Much cutting of "ieie", much more lizarding up steep slopes, still more mud and moisture from mosses, but at last the summit! "Excelsior!" But the summit is a horseshoe affair, and all the shearwaters (neglected) are above the other side of the horseshoe which is the summit I drew last Saturday. Here are the parakeet and flycatcher by voice. No doves nor warblers heard. Altitude 3,500 feet. Here on the summit is an old friend from Aorai,--a red-petalled and red-stamened flower. Here it is a tree some four meters high with moss laden branches from which moisture is continually dripping, for this is well within the fog belt, though a little sunshine at present. I cannot resist the temptation to go over to the shearwater edge, though I may pay for it by a night out without blankets.

A survey with the glasses shows the brink of the cliff covered with dense trees to such an extent that I could do no effective shooting, so I change my plans to botanical collecting and the interesting problem of sliding down to the fern ridge. Tree ferns were quite in evidence the last seven hundred feet, but nowhere do they dominate the scenery. Here the red-stamened tree predominates

with few others around. Blow flies up here and a smaller house-fly. I also found the edible berry of Aorae, but here the flower is twice as large and pinkish red. I think there is one peak east of here that may be higher, but very little and no doubt covered with similar plants. Collected about a dozen numbers of flowering plants, some ferns, several mosses, a few lichens and liverworts while descending. Found what I believe to be two species of the "Tiare apetahi". Both grow well above 2,500 feet.

At that elevation three shearwaters disturbed by my yodeling came flying over me. I killed one, and the dog did a pretty piece of retrieving from far down the hillside in "ieie". Many blow flies present. Parakeets lead the land birds in abundance. I cannot get a good shot at them,--one that will drop the bird upon the narrow ridge. Obtained two parvirostris (?) by the help of the dog. A third dropped "thousands of feet" (as Peale would say) below me.

September 14

Second anniversary of sailing from San Francisco. We went around to windward side of island where the boat was put out, but Mr. Beck decided it was too windy for landing on islets. I remained aboard skinning birds all day. In the afternoon in the dory Mr. Beck killed several bulwer and whitechin petrels and some parvirostris (?).

September 15

Continued skinning the soiled birds, every bird skinned today

save three Bulwer petrels requiring washing. Mr. Beck obtained more whitechins and Bulwers and what might prove to be a Peal's petrel today; also some blue ternlets and a few shearwaters. We sail for Hukuhiva, leaving the windward side of Huapu uncollected botanically and the islets there untouched.

September 16

We arrived at Taiohae Bay this morning. I remained aboard skinning birds. Mr. Brown, who has been collecting plants for the Bishop Museum, came aboard this morning and again this afternoon. We ran through our Huapu collection with him and discovered that he has not been much up among the knife-edged ridges and pinnacles, though he claims to have been at the base of the obelisk of the main peak,--that was lower than my highest altitude where I found the two lobelioid-like plants. (N. B. all references to "lobelioids" in preceding pages are concerning the "Pepperonia" so common all through these islands. If one remains studying until enough is learned to make towards efficient collecting one gets too old to collect efficiently.) He thinks my purple-blossomed "Tiare apetahi" a very rare find. Well, we will work the higher ridges as much as our limited time will permit, for it seems apparent that our goal is Papeete for Christmas and collect as best we can in the interim.

I this day gave Mr. Beck warning that unless my stomach trouble ceases I must return to a dairy land. This brought about a discussion

of my speed at skinning birds, and an acknowledgment upon my part that I did not feel that I desired to "skin birds" all my life. The week at Huapu is an example of what I most certainly do not desire to do,--remain in the hold skinning birds while parties vainly attempt to land on bird inhabited islands. I could not justify myself to sail around for any length of time merely shooting and skinning birds. If such an expedition is not going to find out something concerning the life habits of the birds killed I most certainly do not desire to be connected with it. If, however, one half the time can be spent in the field on the rookeries studying and photographing the birds, then I am decidedly anxious to do my part of the skinning afterwards, and when health permits will work the full fourteen hours from 6:00 A. M. until 8:00 P. M. as we have been doing. But if a "bird-skinner" is what the future leader of this expedition must be, then someone else must be found. Feeling this way about the matter, I deemed it proper and just to all parties concerned to express myself at this time. Perhaps I should have spoken sooner, but it was necessary to see just how this second cruise was to be conducted before I could fully determine the matter. I do not care to be a mere bird-killer,--I do care to be an ornithologist and naturalist, and will sacrifice a great many things for an opportunity to travel, collect, photograph (I've had to do what I could with my own 1A Graflex and no tripod), and above all study and note life histories. I have never been

informed as to just how valuable a hundred words of notes concerning the life habits of birds are as compared to the collecting of an extra specimen. Our nest collecting has been entirely casual. No time value placed upon it. Rare birds, like rails and possibly Peal's petrels,have been left without thorough searching for even specimens, let alone nests. If this is what is desired (and so I'm given to understand) then I do not care to spend the best years of my life at it. There are other fields where life histories can be studied and the ecology of life worked out.

September 17

Mr. Beck today suggested leaving me here to collect fifty or sixty pigeons and search for rail while the ship goes up to the north islands, one of which is labelled a "coral reef". I have asked Jones to note in particular whether any sign of coral is there, and to collect if possible; also to write general geological and botanical descriptions of the islands visited while away.

September 18

This morning I packed up an abundant supply of provisions and all necessary equipment while Mr. Beck went ashore to look after a man for guide and packer. After breakfast I was landed on Nukuhiva with my provisions and outfit to remain two weeks without a solitary franc for any expense that might arise, other than the guide.

The day being late, we could not get away, and upon inquiry discovered that our pack horse ranges the mountains somewhere and it will be necessary to go after him tomorrow and will occupy most of the day. Had I the means of procuring another guide for the morrow I would go to some of the nearby caves for nesting swifts. The men say there are plenty, but as it is, I am bonded to this one guide who has been promised his pay when the ship returns, so tomorrow I'll tote along with him when he goes after his horse, hunting as I go.

At three o'clock I sallied forth to get what birds I could to occupy the evening. Warblers were singing everywhere and I easily obtained seven of them. They are, with one exception, males, and most in the breeding condition. They were singing in the trees on either side the road, and were occasionally found in pairs. I saw one nest which the native boys claimed belonged to this bird far out on the smaller twigs of the topmost bough of a cotton-tree,--absolutely inaccessible. Along the river, which here has a bed some meters wide, blue reef herons were quite abundant. One was very tame as the boat landed in the estuary, merely flying across the stream from us within thirty meters and paying little heed to our actions. Up the river bed they were fishing about in a most unconcerned manner. I obtained three of them, all of which were splendidly retrieved by the dog and not soiled or injured in the least. This mongrel pup that I picked up at Moorea has increased

my hunting capacity at least two fold. I no longer worry about underbrush or water ; when I see a desirable bird I shoot it, and the pup retrieves them all. Swifts or herons, it makes no difference what size they are, he gets them, brings them to me, and drops them at my feet. I have him so well trained that he does not touch white birds. His one fault is that he holds tender-skinned birds a little too hard, and some doves he rips. He certainly earns his board, though he gets knocked about the ship in every direction save by the sailors, and is forbidden the privilege of sleeping in the hold.

I succeeded in shooting but one swift, though there were several of them flying about the village and a few along the road and river where I was hunting. What an abundance of caves they have here to nest in! This valley appears to be an immense crater about two thousand feet deep, the village and river being set against the western edge of it where one of the grandest masses of cliffs in the world arises above them. Carved into a multitude of sharp ravines--or even rock slides--with projecting needle-tipped jagged ridges, these cliffs are about as attractive as anything I have yet observed in mountain scenery. The volcanic rocks are exposed in layer after layer, mostly regularly set one above the other, but frequently irregularly shaped. Soft portions have worn away from beneath harder strata above, forming innumerable caves and projecting ledges. Above the jagged portion is a cap of vegetated slope with here and there a protruding rock. A picture alone

can give an idea of the vastness of this stretch of rock, above which heavy clouds threaten showers.

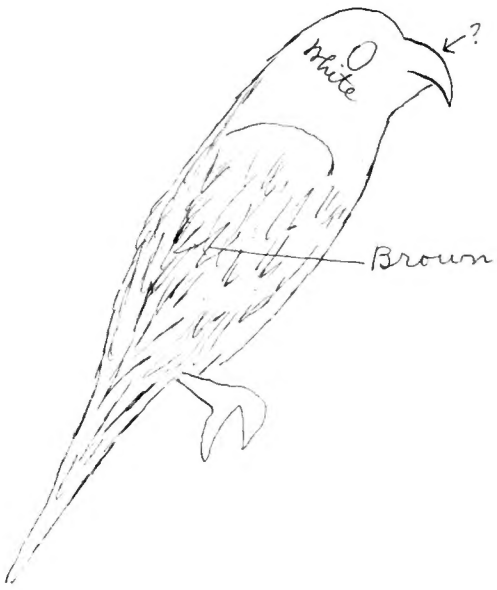
My guide has lodged and fed me (though penniless, or francless, I'm not exactly a pauper). Had taro for dinner and it really tasted quite good for a change from yam. The sand flies (I've not collected any yet,--they appear to be gnats about two millimeters in length) are a little bothersome already, but thankfully they retire at dusk. They are reported to be less abundant than usual. Skinned out the swift and seven warblers this evening after dinner. Also collected a bottleful of insects which gathered about the lantern. Had I brought sufficient kerosene there is a large lamp like the one we use in the hold here.

White terns were observed above the trees all up the mountain side and several were above suitable trees here in the valley. Obtained two in fairly good shape. They soar high above the valley floor in such a wind as this (it is holding our ship at anchor here) with more grace and action than any of their family relatives. Light aery sprites with delicate curved wings, they swoop about and soar up into the gale as only they can. I know of no other bird to compare them with. All through these Polynesian islands the little white terns racing like well spanned horses in a circus, changing sides at the sharp curves, but ever keeping just the proper distance apart, always swerving in unison as if they follow definite commands,--they have been the chief charm of many an hour of

leisurely gazing heavenward. Here is the smallest of the genus in these waters, and he is all the more fairy-like in his flight.

September 19

Spent the morning skinning terns and herons while my guide performed an operation upon his three year old stallion. At nine we leave for the highland pastures after his pack horse. Here is that heavily red-flowered tree so common in Huapu. My guide tells me of a strange lone bird seen feeding upon those flowers in October, November and December last year. The guide has seen no others anywhere. (This bird later was identified as a kingfisher,--wings and back decidedly brown, not blue.) Warblers are singing merrily all along the road. Many white terns, a few noddies, and still fewer yellow-billed tropics about the cliffs. Few doves observed. We have information regarding the man who knows where the swifts nest. Perhaps by promises to pay when the ship returns I can get guidance to the cave.



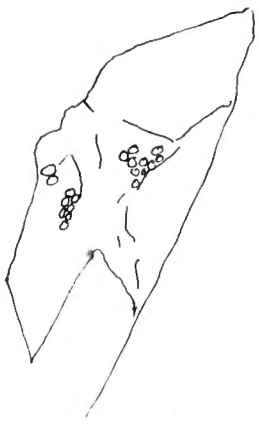
The guide, Frances, tried in vain to give the call of the

bird he told me about. After more than an hour or so of traveling we are but four hundred feet by the barometer, but it has not been set for some time. I put the zero at the 29.30 inch, which gives us one thousand feet. Frances tells me that Mr. Beck was up nearly this far photographing the little cascades (the lower portion of which is hidden by a pinnacle of rock) which come over the precipitous west wall of the valley. Here warblers are singing hilariously and white terns are about in their customary profusion. I obtained one of the two swifts seen flying about beneath the mango trees along the trail in lower part of the valley, fruit flies probably being the attraction there.

Here is a warbler in a mango tree above the trail so exuberantly relieving himself of melody that I cannot resist stopping to listen. The musical part of the song is interrupted frequently with sparrow-like chirps. He hops among the leafed twigs catching insects between bursts of cheerfulness. The ravine here is alive with these singers, yet Herman Melville called the Nukuhiva birds dumb! The cliffs opposite here present many caverns and ledges capable of furnishing nesting places for sea birds and shelter for swifts. The so-called sand-fly, a gnat not unlike our buffalo gnat at home, is quite bothersome about the face, hands and ankles.

We ascend to the base of an old volcanic rock which rises with little recession above four hundred feet or so. Our elevation here is 1,250 feet (cor. 650), 0 at 29.5 in. (cor. 28.?) Swifts

are flying about above us with noddies above them. The shot will hardly reach them, but after lunch I contemplate climbing a tree and trying to shoot them from it. There are two clusters of nests in small recesses. Less than thirty centimeters of overhanging rock shelter them. These birds, then, are of the cliff nesting rather than cave dwelling type. But I'll have to do some good shooting to get them. Now four or five have settled on the nests. A shot brings one down. I've got it labelled "Cliff".



I climb a tree some forty feet high which gets me well within range of the nests. But during the hour I am up there the swifts do not go near their nests. My position is too insecure to warrant wing shooting. The few shots I tried aroused a pair of doves from a neighboring tree.

Below is a rock on which rest two sections of log hollowed out and open above containing some very small bones. If human they must be those of very young infants. I took my shoes off and endeavored to reach them for a close inspection, but was unable to

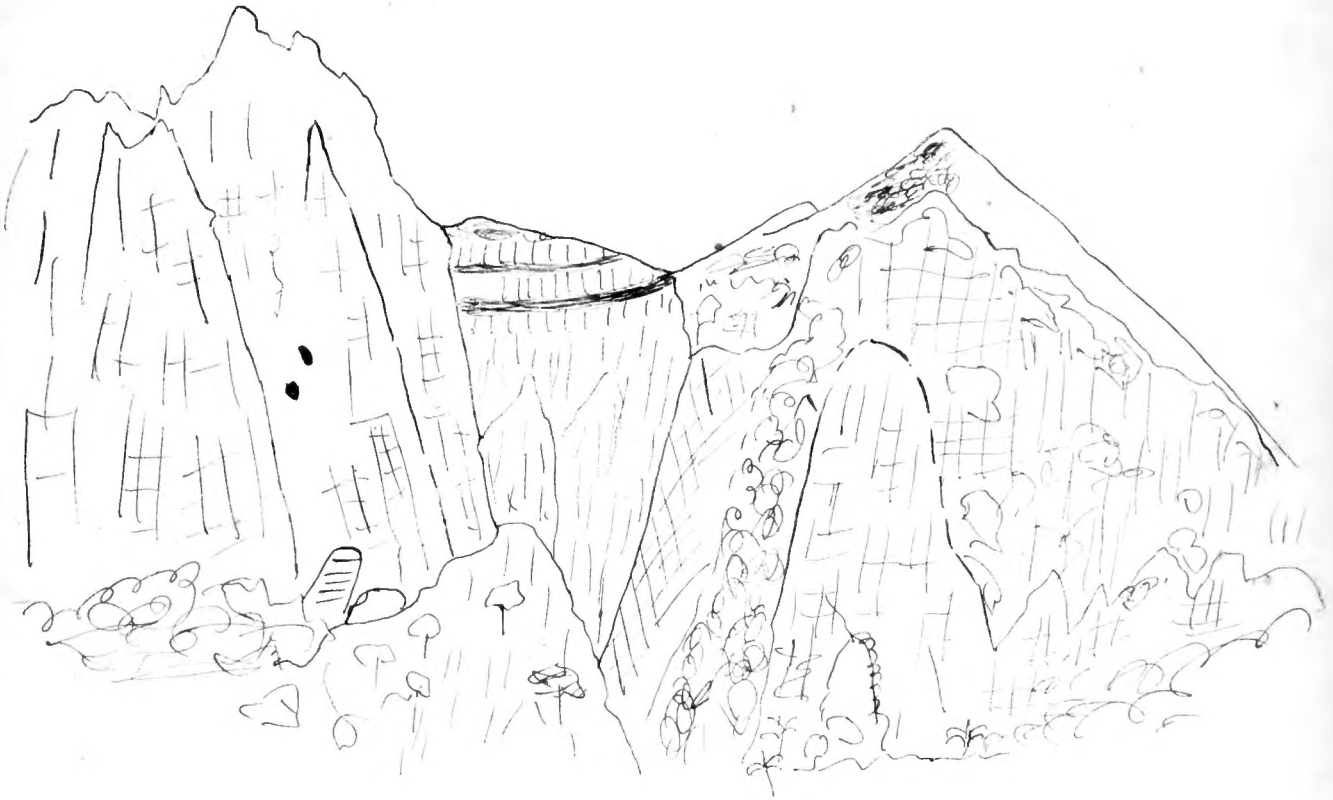
make the last two steps. In the corner of the rocks was a considerable pile of very old ragged tapa cloth. I had to promise my guide not to touch anything before he would boost me onto the lowest ledge. There were covers for the small troughs which were not in place but resting upon the tapa pile. The troughs were about fifty centimeters in length and about fifteen centimeters in diameter. Franc says there is another Kopeka peka (Tahiti "Opea") rock near here, so away we go! These swifts strike me as being of two sizes here beneath this one rock. There are solitary nests higher up on the sheer cliff wall, which may account for the other or apparently longer winged bird. While flying about the nests the birds make a light squeaking noise easily repeated by tightly compressing the moistened lips and sucking. When this noise is made the birds congregate above the tree I am in. Wasp nests are abundant all over the face of the cliffs; also mud-daubers, solitary wasps.

Kokohuia, the bird mentioned on page 15 is the Eiau kingfisher, white-headed. An old man informs me that they are in another valley. The bird then was not eating the red flowers of the parakeet tree.

Very heavy showers this evening and throughout the night, which make the guide doubtful about leaving tomorrow. Procrastination is Polynesian. The swifts were rather slow skimming, but I was quite encouraged with the warblers.

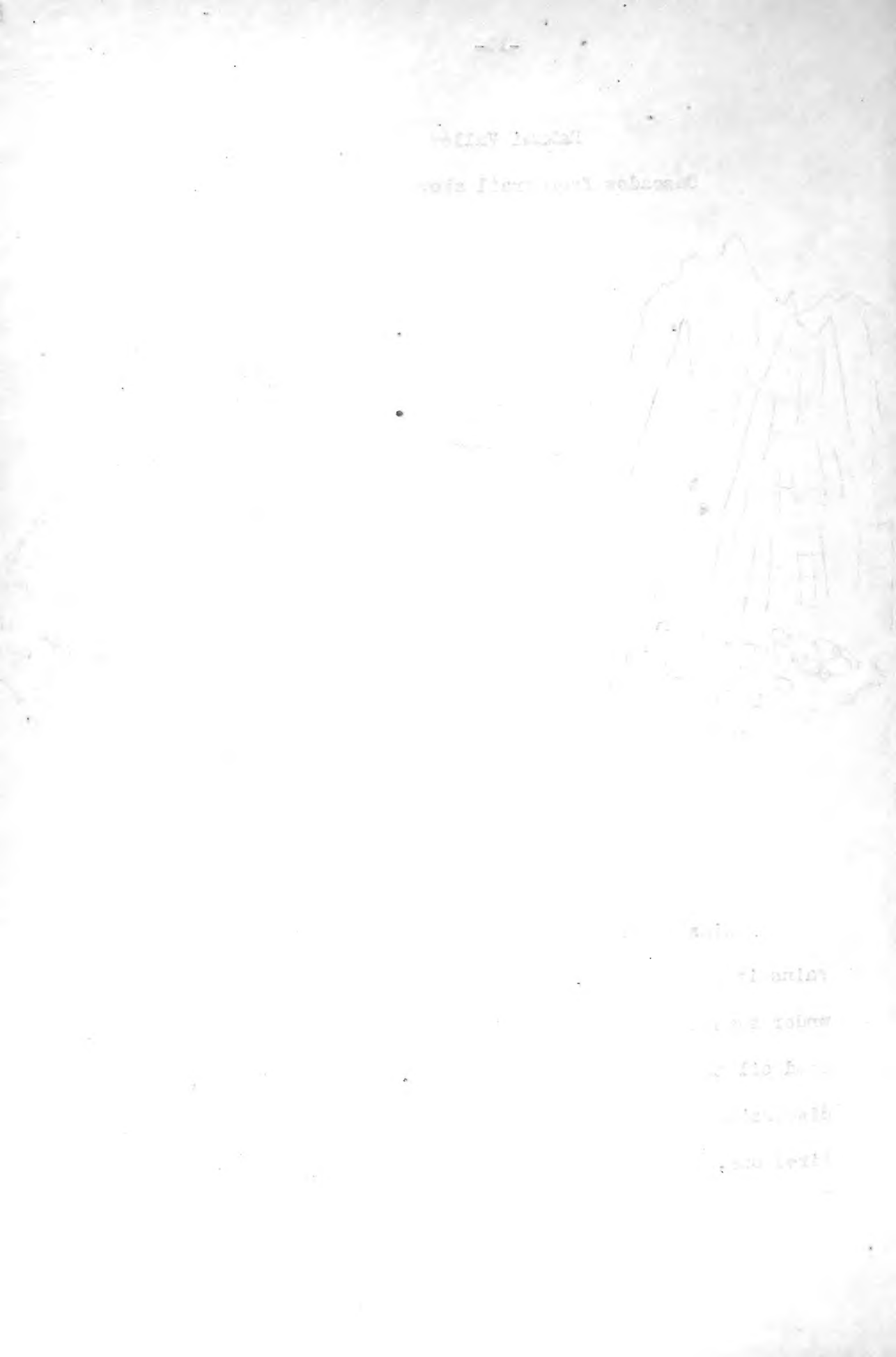
Halmaui Valley

Cascades from trail above ?



September 20

Rains continued until just before daylight, and when it rains it simply pours. I had visions of my well bleached shelter under such a downpour, so this morning I boiled a bottle of linseed oil and rubbed it into the silk. At nine o'clock, the clouds dispersing, we packed up two heavy loads for the horses. Mr. Beck hired one, but two were absolutely essential, for guides here carry

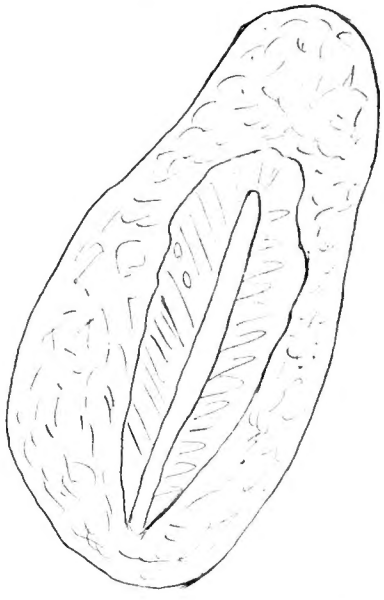


nothing, in this respect the Marquesans being far in advance of the Tahitians, which may account for their rapidly succumbing to civilization's accompanying diseases. Franc says that an old man told him that the Chileans and Peruvians came bringing disease; that this valley formerly held three or four thousand people; that in one day as many as two hundred had died. Now there are few over one hundred here.

The night's rains have filled the stream and the cascade across the valley is gloriously flush. From here, below where I sketched, we can see about one hundred meters of fall, and Franc says there's as much below, but I would judge about two-thirds. It is higher than Fantana and much more water, but not so sheer in drop. It is too abrupt to be properly termed a cascade, but in French that term applies. Franc and I with necessities up the valley trail, boys around the horse trail with provisions and camp. What the boys will get out of it heaven only knows!

At 250 feet we left the valley trail and cut up the side hill on a short cut for the mountain. At 750 feet a rooster is crowing beneath some maupi trees beside the trail I left after game. Franc's dog, Friday, went ahead and flushed the birds, but I was near enough to get a shot through the trees and dropped a laying hen. Nothing but tame chickens run wild, so we are not collecting them when bulk will be occupied by the pigeons. Overhead us all along the trail the warblers continue their merry

chirruping. How like the California thrasher's song it is, but these birds do not sing in rain. Give them sunshine, though, and there certainly is merriment abroad. The woods, the brush, the cocomut groves,--all are filled with their delightful harmony. I am not musician enough to record their whistling, though I can give a fairly good representation of it,--one the natives can identify. Mosquitoes are terribly bothersome in here, where I await the return of Franc who had to go to call off the dog, Friday, who went on a pig hunt. He brings her back in his arms and reports a big boar with enormous tusks. Franc reports that Rupi eats guava. Here I find a mango, and in the tree hangs another undoubtedly eaten by the dove, which is the only fruit-eating bird down here. The bill marks are about the size of the dove's bill. There was a stem near this, upon which the dove could perch while breakfasting.



Up the rocky slope on zig-zag ledges to 1,450 feet and still we are below the brink of yonder waterfall; and since its bed is about three hundred feet it must fall at least twelve hundred. If a [illegible], I'm going to visit the brink of the falls and there get a check on the altitude I am surveying for today. Water in the bottom of my cup is a

good level, but the sites are poor. The warblers are still with us and as cheerful as ever. Doves cut loose from here and glide down into the valley on wide-spread wings, one about one hundred meters behind the other.

My estimation by leveling of the brink of the cascade is 1,650 feet. We stop for lunch at Franc's house of Niau near a fresh stream of water. Upon reaching the summit of the ridge I obtained the first bird of the day, a swift which would have been hopelessly lost in the dense ferns and guava but for the efficient retrieving of Noha. Here above the little stream I see damosels and dragon-flies (the latter a brilliant orange) and gnats above the water, but I am not equipped to catch them. Here I observed a long-bodied spider (collected) weaving its web within ten centimeters of the water's surface, almost horizontally stretched. I watched him catch ten gnats, then went after the cyanide bottle. Upon my return another of like appearance was approaching the web. Followed a short crossing of swords out in the center of the web, whereupon the builder being smaller vacated in favor of the other. I caught them both. The fresh water prawn is here and is well adapted in color to the yellowish scum under which he hides.

We strike out up the trail with the horses following soon after. Packing here means a boy with each horse to drag it along. Three curlew raised from a bare hill, but my whistle was dry so I could not entice them within range. We reach the summit of the

rolling hills and behold a broad sweep of shallow valleys, the one below us being the headwaters of the valley we left this morning. The fern-brake here is abundant, while the stream banks up, forming small pools with dense growths of tall grass in a swampy condition. Are the rail here? The natives know nothing about the bird. We see a large boar ascending the opposite hillside. Away goes Franc and shoots at long range. Another stream with wooded bed and more dense grass. Doves and warblers and again a curlew heard. Warblers! Warblers! Warblers! Blessed Conopoderas! you're the one and only real songbird in all these islands. Yet you make up for the lack of others by your exuberance and persistence. Ravines full of hibiscus are alive with them. The scattering shrubs on the fern-clad hills have their inhabitants and all are singing merrily.

On the summit at 2,700 feet and down across some more ravines to where Brown camped. Still some distance to the Rupi, so I decide to go on to next water. More rolling hills and poorly defined ravines; in fact, I'm considerably puzzled as to the drainage of some. We are now near the base of the high ridge which extends across the island in a north and south direction, and I surmise it separates the so-called desert region from this moist portion. The pigeon apparently dwells in ravines on the face of that ridge where certain food trees occur. Heard no sound of them today and saw but very few doves. We camped at the edge of an hibiscus grove near a small rivulet. Cattle trails follow around these groves which are

rather impervious to aught but rats and possibly pigs. Dense growths of twisted limbs and ferns, "ieie", and other undergrowth form a cool, damp ground ideal for rail. Spent an hour searching for same before dark, but heard no sign of them. Tomorrow we try the ravines nearest for pigeon, but unless we find them, will move camp over to where Franc knows they are. He thought I should camp back where Brown camped, but I could see little there for camping and it was in a small ravine with no hearing range.

Until eight this evening no shearwaters have been heard. "Kaua", Franc says, lives in holes in Hivaoa, but he has never heard them here. Odd indeed, and yet it seems that few, if any, of the sea birds found at near-by Huapu are here. That island loomed up splendidly today. The high obelisk (Mona Tokopoto, so Franc says) stood well above the flat topped mountain I ascended. Here at Nukuhiva there are no such climbs to make. Brown could have ridden his horse to the summit of the highest ridge here. There is very little chance of finding anything he did not get. It is interesting to pick out an unusual plant and listen to the guide tell how pleased Brown was when he found them.

September 21

Temperature last night at seven was 70°. During the night came a few light showers, but the freshly oiled silk sheltered us well. After the storms clear starlight prevailed. At

4:15 A. M. I became so chilly that I was obliged to put on extra clothing. A match revealed the thermometer at 57° F. This morning at 6:00 A. M. it is 58° F. The barometer reads this morning 2,650 feet.

Last night I was wondering how to account for the formation here. This one long cross ridge which is barely indented, and these rolling hills and lower ridges where the ravine heads have not yet internotched are evidence of young erosion, for the ravines are sharp walled. The deep precipitous gorges extending inland a few miles are rather young too, but there are also drowned valleys revealing the sinking of the land as a whole very recently, the beach shelving here being less than at Huapu. But what was the condition prior to the last sinking which drowned the valleys? The little rock I have seen more nearly resembles rhyolite than anything else along this upper stretch of trail. In the valley the lavas predominate with an apparent tilt of typical lava angle, but up here the slope of the surface does not conform to that dip. The eastern wall of the valley has great masses of columnar structure, not the small hexagonal posts but enormous massive, imperfect columns. The western wall is composed of innumerable ledges of small thickness superimposed, for the most part, conformably. Occasional non-conformities do appear revealing a slight weathering prior to successive flows. It would be very interesting going over the cliff with a thousand feet of cable and making a detailed study of them. From

the summit of yonder ridge I hope to gain a little better idea as to what is what up here.

The guide says he heard the Rupi this morning, and gives a very different call to that of Globicera aurorae. This may after all be a different genus. Certainly the isolation has been sufficient to produce such a separation of form and character. Why is it that the other Society Islands besides the two largest windward ones have no Rupi? Why does Makatea have them when they do not? Why does Nukuhiva alone of all these Marquesas isles contain them? I doubt the authenticity of two species of dove from here, but will watch carefully for another from the higher ridge. The warblers were holding early mass when I awoke at six A. M. The boys gathered neither grass nor ferns to carpet our dwelling. It shows signs of formerly sheltering cattle, and fleas were very abundant. A fog bank hangs above the upper ridge, but the sun is commencing to shine here. No sounds of rail about here.

We strike out for the slope of the ridge where the Rupi are supposed to be. A few swifts about, one of which I get, the dog doing some clever retrieving. A curlew answers my whistle and comes within range. The shot aroused a parakeet like those at Huapu. We ascend a promising ridge. The first pigeons are a pair flying slowly along the ridge. Another seen later going in opposite direction. Two others observed,--one flying within a hundred yards. I tried a shot at long range. Cow trails soon cease and the boys want to turn

back, but I send them ahead to cut a trail to the summit. The fog rolls in about us. A tree here with many small berries much resembling the tiare Aorae,--no blossoms yet observed. Another tree whose leaves when crushed give of a pungent, pleasing odor also has small berries. Only a few straggling Pua trees upon the fruit of which the Rupi feeds. These have no fruit at present. Once again I find myself handicapped. The pigeons dwell most abundantly in another valley, so Franc says, and claims he told Mr. Beck so. Why then did not the ship take us to that valley where the chances would have been best? We will do well to get three birds a day here,--well to get any in fact. Progress is slow in all directions, and the birds merely flying about. Franc seems not to know where they are most likely to be. Apparently there is no trail from here into that valley where they are abundant. Not having means to hire boat passage around to another valley I'll have either to make a trail or remain here and put up warblers which are as abundant as ever.

From 3,500 feet to the summit here at 3,750 feet the brush is dense and overhead, requiring unusual cutting. These Marquesans are not the woodsmen the Tahitians are. It takes until well past ten o'clock to reach the ridge, where the flora somewhat resembles that at Huapu from 2,700 feet upwards. The ridge summit bears the small Fregementia, but I could find no sign of fruit upon it. Here too is a lobelioid,--if no milky juice is significant of that plant. My collection is limited, but I tried to get one

specimen of everything and as much as I could carry of unusual looking plants. It was very interesting to listen to Franc explain Brown's interest concerning each plant I collected. My estimation of their importance seemed to check with his imitation of Brown's enthusiasm. Brown, according to this boy, did not reach the summit of this ridge. A short view down the other side convinces me that the lad is right about the impossibility of moving camp down there. I may be able to get down into the birds myself, however.

Had I the means of meeting any small expense that might arise I would tackle going around to the other "Tapueahu", as he calls it. I may try it on my face and bluff. I was never so mad about anything in my life as I am about being dumped on this island without one franc expense money. One or two francs properly placed will achieve marvels with these Polynesians, but the very minute they discover one has no money nothing at all can be done with them. It now appears that Franc's own canoe takes lots of sea, but there is another which requires three men that will do. How am I to satisfy the extra men and still make them think that the Museum really has money for expenses? A little judgment in the expenditure of funds will achieve much greater results per dollar than all the parsimonious closeness practiced by some people.

A few swifts were flying about the ridge, and doves were a little more frequent than usual; warblers still abundant and still

singing. We descended the trail until at about 3,200 feet, where we had observed the birds in ascending. Here we sat down and waited. Three pigeons were seen, the last coming well within range, flying very slowly yet easily. I waited until he was above the ridge on which we were, and then deliberately missed him with both barrels. No excuse for it, unless it be my madness and anger! He turned and soared down into the second ravine from us. The two horse lads of whom I cannot rid myself, went on down to camp for lunch and to bring ours to Franc and me. We cut down into the ravine where the calling of some birds was heard. The call is, as Franc imitated it very accurately, a low-toned bass, guttural gurgling,--"Neah-ah-ah-ah-ah!", said so as to make one's throat sore. Successive callings left me a sore throat, but got no bird to come my way. I could not see far from the ravine I was in, but hoped the bird would be in the trees above it. At last I took a pig trail up the side and stopped beneath a large tree from whence I could see something of the ravine sides. The calling ceased and a parakeet stopping in the tree above me diverted my attention to the smaller bird, few of which are to be found here at Nukuhiva, and never before noticed by these boys. The shot that killed the parakeet scared three Rupi from trees up on the ravine sides well beyond range. Two calls were later heard but the brush was impenetrable up the ridge. We then decided to ascend the ravine beyond, into which the wounded pigeon had descended and whither these seemed

to have gone.

Nothing came of the strenuous efforts required to get there, and, hearing the boys returning with our lunch, we went back to the trail to eat. An hour of patiently waiting and watching on the ridge brought no results, so we returned to camp with but the parakeet and one swift to show for our day of brush fighting. After writing this my decision is made: I am going to abide by the preparations provided for by Mr. Beck and the result will be up to him. My time will be spent in fruitless hunting instead of skinning birds.

Temperature at 6:00 P. M., 63° F.

September 22

Temperature at 6:00 A. M., 63° F.

This morning I sent the boys down to the village, my guide (or Master) Franc to bring back enough provisions to last next week or longer. After they leave I strike out for some banana beds on the hillside. Following up a ridge I stop to rest at a prominent point for observations. The warblers are singing so vociferously that nothing else could be heard unless loud and close, yet it all is in harmony, though not in unison. While I rest two warblers come from the hibiscus in the ravine below and create quite a disturbance from the shrubs above me. Their expressions of wrath much resemble that of the robin when the feline enemy is near his nest. After watching them scolding me from a few meters overhead for

awhile I set about diligently to find the nest. An old nest was found on one side of the ridge and just opposite it in a low shrub was a new nest into which I could see from the ridge. In it were smuggled two well feathered nestlings. I had previously killed the birds, shooting at one which I picked up and wrapped, when along came the dog with the other bird which I had not seen fall. Both parents, young and nests,--well I had not intended to work on warblers, but this collection has more than passing value, and there is more to it than four bird numbers. Altitude 3,000 feet; situation a few open shrubs on fern and grass covered dry ridge; northwest exposure, but in such a position that the sun would strike it at least by 8:30 A. M. The nest, which I hope to preserve intact, is composed of moss, lined with grass leaves so as to form a cup 4.5 centimeters in diameter and 3 centimeters deep. The two young birds sit opposed so that one orange throated beak protrudes from either side,--head and tails arrangement. They just about fill the nest and seem to have even stretched it into an oval shape. The nest itself was well shaded by the leaves of the shrub, in which it was between two main branches, though mostly within the branchlets of one. There are at the very least a dozen singing warblers so near that I can locate their positions.

Proceed by ridge and ravine to the most accessible bananas and find them growing at 3,250 feet elevation. A few clusters of half a dozen each are growing amidst a dense growth of sugar-cane. Collection of the bananas will be rather unsatisfactory, for the

pigeons have eaten most of the fruit while it was still green. Here is a cluster one meter in length which bears but six clumps of bananas. The clumps are about 8, 6.5, 4, 3, and 2 centimeters apart on the stem. One other clump seems to have borne one miserable finger-tip. The longest fruit is not five centimeters in length. Three clumps form a complete encircling of the stem with edges slightly overlapping. I'm collecting flower, leaf and one or two of what remains of the clumps of fruit. Everywhere the fruit is eaten by the voracious pigeons which seem to be in the habit of flying along this ridge at about this elevation searching for food. I'm about of the opinion that the best way to get them is to come up here early in the morning and camp on a promontory over which they are likely to pass, and then patiently await their arrival. I saw two birds soaring along here as I ascended, but have not seen any since arriving.

Tree ferns here are even less abundant than at Huapu. Nowhere do they dominate the scenery. The sugar-cane does not appear to be in flower. When I work my way up to the designated promontory I'll have a better chance of finding it. Bird hunting here is about as bad as at Tahiti, only the doves are more scarce here and there are no kingfishers. There are warblers enough to make up for everything else. A striking feature of this portion of Nukuhiva is the almost total absence of ants. Here are two birds left in a tree four hours and not an ant upon them. That couldn't happen in Tahiti. But at that there are ants here on this ridge.

No better conditions could be found than where I was to-day for rail, yet not a sound of the bird, and the natives know nothing at all of him by sight or sound. The warblers are singing as merrily as ever. How could Melville ever call the birds of Nukuhiva "dumb"? Of course over in Typee valley they may be perfectly dumb,--I cannot say. The valleys are immune from my attacks, for I do not care to attempt descending them, unless it be the one where the Rupi lives, and I may get mad enough to go down precipices to get in there. This hunting here is certainly futile. Tomorrow I think I'll try again on yesterday's trail, or even up in the ravines where we heard them. Franc says a Frenchman came up here when the guava were ripe and killed ten birds in one day. But now there is hardly a guava fruit to be found, so the Pua along these ravines above 3,000 feet is the only attraction for them. He swears the birds never nest over here, but only in the valley of Tapueaha where different foods keep them well supplied all the year. Save the two birds observed this morning while ascending nothing has been seen or heard.

When I reached the warblers' nests the two young birds were both facing the same way and greeted the first noise with widely open bills. Too windy to get a good picture of the nest, but I tried a snap of it in good sunlight with the diaphragm wide open. Just before reaching camp a parakeet flew into a near-by tree. I shot him, and immediately afterwards a swift. What an

advantage it is to have the dog! He retrieves one bird while I'm shooting the next one. There are more parakeets here than I at first imagined. They are well down here too around camp. One came into the tree above the shelter while I was at supper, but left just as I aimed at him. I am wondering where these swifts range from. The nearest rocks are five kilometers away at the least. They are about here in scattering pairs or singly.

The thermometer was near 80° F. when I returned to camp, but some sunshine reached it through the leaves. A cloud passing over and sprinkling a little gave it a chance to drop down to 75° at five P. M. At seven P. M. it was 64°.

Coming down the ravine below the bananas and at them I collected two varieties of snails, obtaining quite a handful which should give a good series of both kinds. They were on a variety of leaves,--sugar cane, banana, "ieie", ferns, hibiscus, "kava", and a liliaceous plant, which was unfortunately not in bloom. Found no flowering sugar cane either.

Saw a rat tonight at supper time, but he was too quick for me. I also saw a mouse along the trail once to-day. The bothersome gnat seems to be plentiful only near water. A few mosquitoes this evening but not many. Light sprinkles all evening. Temperature at 3:30 A. M., 64° F. with showers.

September 23

At three this morning I raised with a startled sensation

and vaguely heard the end of the rail's clatter, or at least that was my impression. After continued listening nothing more was heard save very occasional "ă-ă" of the warbler. Then I dropped off to sleep and caught a rail resembling the P. atra from Henderson Island. The rail in my hands metamorphosed into a beautiful woman,--and that was time to wake up. This led me to the conclusion that the 3:30 clatter was all myth too. Showers this morning until after eight o'clock, so I remained in camp working on plants.

While ascending the Thursday trail and but a little way below the spot that I have selected for my lookout station a pigeon was seen flying southward just above the location. After soaring over several ridges he seemed to alight in the vicinity of the bananas visited yesterday. Here at 3,350 feet I erected a shade on a promontory and have camped for the day. One parakeet came over me when I was loaded with sixes. He did not remain long enough for me to change cartridges. A few swifts pass frequently. I succeeded in getting one of three, and the dog, after several minutes of searching down the ravine side, retrieved him in good condition. How few of those birds would be obtainable were it not for the retrieving of the pup! A dove that flew by I dropped down the ridge below me. Again the dog found him after long searching in the ferns. Finally a pigeon comes soaring along from the south, but swerves out beyond good range and so passes safely through two charges of shot. He was traveling rather rapidly down wind. Later

I saw one soaring against the wind for considerable distance and increasing his altitude at the same time. The striking feature about this bird's flying is the infrequent flapping of the wings and the long continued soaring,--a style of flight not customary to pigeons of my narrow acquaintance.

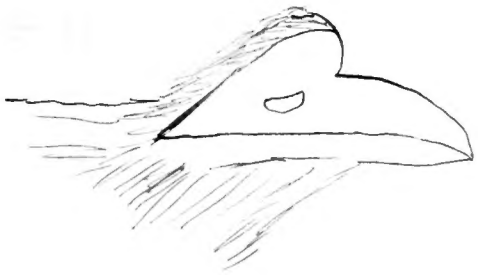
A heavy flapping of wings below me, and there just beyond range another pigeon raises over this ridge. Soaring without a flap he crosses one, two, three, four ravines. The ridge there requires a few more flaps for elevation. He alights in the fifth ravine behind the ridge, but amidst a grove of Pua trees. The flight of these birds is along the ravines between 3,000-3,300 feet and coincidentally (?) that is the altitude range of the bird? Or has the flight of the bird distributed the trees along that particular route? The flight of the birds might have been determined by the banana beds visited yesterday. But when the guava is in fruit the birds are all over the broad valley floor below. It may be that the Pua is not then in fruit for distribution, or rather that it survives only at this altitude which is just below the customary fog belt. The Pua being a determining factor in the location of these pigeons, I have decided that a position upon the fourth ridge to the northward will be more advantageous than this, so after eating I'm going to try to get over there. Monday I will take up a position there and by getting there early in the morning hope to get a bird or two.

Warblers are as cheerful as ever. What a blessing this has been since I got rid of the natives! White terns are about here rather sparingly. While we eat a green dove comes across the ridge below us. I miss the first shot which should have dropped him on the ridge, so take another and he falls into the very bottom of the ravine. Away goes the dog, and, guided by rocks thrown as far as possible in the proper direction, he returns all winded but with the bird in fairly good condition in spite of its tender skin. I would never hunt land birds without a dog. He may soil a few feathers, but he certainly finds the birds.

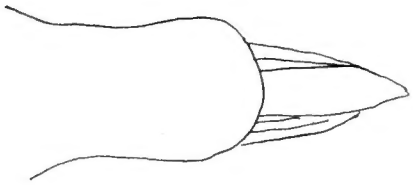
We descend the trail to the forks of the ridge and there cut down into the head ravine and up the ridge beyond it, which is the fourth ridge from our former location,--a very brushy fern clad ridge, but a pig trail gives some footing and shows the way. Cutting of ferns and brush continually makes me thankful I filed the bolo-knife this morning. At the first Pua tree (3,275 feet) I stop and "Nah-ahah" for half an hour with no results. Then while watching a warbler there comes a big shadow before me. He comes towards the Pua tree five meters up ridge, passes it, and comes on towards this one directly for me. He sees me and swerves around the tree, but I risk blowing him to pieces and fortunately just clipped his wing. The dog gets down first and is killing the bird when I arrive. They appear larger than the Makatea bird and

certainly have a very differently shaped culmen.

Right lateral view of bill and culmen. No. 4836.



Dorsal view of same.



Iris,--milky white.

Bill and culmen ? greenish black.

Feet,--reddish brown.

Within ten mimutes one, two, two, two, and one birds fly from the north, whence nine came, to the southward. Only one of them came within range, all flying on beyond the other ridge just below my outpost. One bird returned and alighted on the dead tip of a large tree on ridge opposite. He remained there for twenty mimutes in spite of my calling. He did compliment me by looking around at each call, and another bird answered me from the left ravine. At three o'clock, after a pause on another tree, he

departed. Two others flew from south to north somewhat up the ridge from me. Monday should get more than one bird, and all next week the guide (who brings my twelve gage) and I will take up a position in these paths of flight.

Returned to camp by cutting across what appeared to be a meadow. It was ferns and grass waist deep, interspersed with tangled guava of the same height. Obtained a parakeet and one white tern along the route. At camp, after building the fire, I skinned out the pigeon and two doves and added them to my pot of beans. Had a delicious meal, but am not yet capable of enjoying good eating. The pigeon tasted as good as any bird I ever ate. Temperature at 6:00 P. M., 64° F.

Just before dark I heard a rail clattering in the dense fern brake across the stream bed. Called for him until too dark to shoot. Then it was no myth this morning after all,--except the woman.

September 24

Temperature at 6:00 A. M., 59° F. Barometer, 2,650 feet.

To-day is the end of my first two years in the South Sea Islands. Fittingly is it being celebrated. Somewhat before daylight I was awakened by the chilliness of the Nukuhiva night. The blanket left by my guide was a welcome addition to the two in which I was already rolled.

The additional comfort, however, brought no sleep. Who could sleep in such a place? Even at that early hour the clattering rail was disturbing the early Sabbath morn as much as the clanking of milk bottles ever did. Follows then his saucy piping, for he knows full well that the dense fern-brake in which he dwells is safe from all enemies save that rat now scampering from camp up the near-by hibiscus tree and along a maze of branches to his nest. He serves here a good purpose in keeping camp clean of all morsels of food. Again the reverberating trilling clatter of the rail startles the morning solitude.

Now comes the first faint streak of dawn, and with it commences the early morning mass held so regularly by the orthodox warbler. If ever there was a true worshipper, Konako is one. His services commence with a song of merriment at the break of day, continues until dark the most cheerful and exuberant chorister in the world, and with a hymn of joy he gives grace before and after each meal. By the time the sun has risen the whole woods are one great choir. The last clatters of the retiring milkman can hardly be heard through the songs of these exuberant newsboys.

With the sunshine comes the fluttering of fairy wings and the clucking of that truly aerial sprite, the little, delicate snow-white tern,--a sea bird which is more a part of the Polynesian islands than any land bird, for they are found on the most deserted coral atoll as well as on the most abundantly verdant tropical

mountainous island. At rest on the branches of the largest trees or hovering and clucking above them, these fairy terns seem to be an essential part of the woods. But when the tradewind arises and soaring becomes the sport of the hour these spritely masters of the air come in for their own. Most frequently in pairs they soar into the wind until a good elevation is attained; then down they come in a glorious glide, swerving upwards or to left or right and dashing about like the best handled kite, but always in perfect formation about one meter apart. On sharp curves of flight they change sides like well trained circus race horses. Now they soar higher and higher until they become mere specks of white against the blue sky.

Sunshine has brought the insects to life and the morning songs of the warbler are now but short hymns of grace giving thanks for each delicate fly or moth discovered and devoured. With the insects comes another master of flight,--a little black fellow with long sharp wings and a broad mouth, and two very keen, alert eyes capable of detecting an insect instantly. Now soaring briefly, now turning sharply and rapidly this way or that, the little swiftlet quickly gets a mouthful of flies (I wish he'd come down nearer camp) and off he goes in a direct flight towards the cave or cliff below this plain where a little delicate clump of moss is glued to the wall of rock.

Now from the distant hillside where grow the fruitful

trees comes the cooing of a dove,--and another. There is a flash of bright green and a sparkle of light yellow and salmon pink in that cluster of green leaves. Now perched upon the topmost twig the dove can be seen watching a movement in the neighboring tree. Another flutter and a streak of green as he glides into the other tree. A greater flutter, almost commotion, and out of the tree come two verdant flashes. Up and up they go, then a long straight glide and over the ridge out of sight. It seems so odd to see doves soaring and gliding about high overhead, apparently enjoying the thrills of altitude tests as much as terns or man.

"Naw-aw-aw", deep throated and guttural comes a strange cry from the Pua tree. A heavy flapping of wings dark bluish green and the huge fruit pigeon, Rupi, comes soaring against the wind along the ravines that face the ridge. Huge for a pigeon, massive in build, slow and steady in his soaring flight, he passes along the zone occupied by the Pua trees and wild bananas. In other seasons the guava shrubs which grow all over the plain below attract him from this zone of flight. Now he alights on a dead tree top and looks as big as a turkey buzzard and almost as awkward. The feathered saddle above his beak gives him a very odd appearance.

There is a sharp piercing shrill squeak, and here above camp two little balls of light blue and white are circling about and shrieking at us. Now they alight on small twigs and, hanging

in the most grotesque manner, scrutinize us at length. We make the slightest movement and off they go shrieking fearfully. Little nectar eating parakeets,--love birds if ever there were any!

Such is a Sunday with the birds of Nukuhiva, and certainly it is not an unpleasant place and time for worship. At one o'clock I struck out for a little pleasure jaunt sans rifle and ammunition. Followed cow trails so long as they headed towards the cascades. My first attempt to follow the ravine proved rather disastrous and got me into a growth of grass up to my neck where I could not see the small gulch cut by the rivulet. So I took a ridge to right, and later swung down towards the main ravine just in time, or place, to get a good view of a pretty little fall. I may be over-exposing my pictures here, but I'm stopping down to the limit for definition.

The next attempt at the ravine was made with the aid of the cinet I carry for such descents. It goes rather hot on the hands over sheer drops, but this one was only a few meters high with soft dirt below. The main stream has a channel some six to eight meters in width, while the ravine bottom is twice or thrice that wide. Floods have filled the ravine at least ten feet deep, as evidenced by the rubbish caught in the guava shrubs that high. Dense growths of hibiscus sometimes occupy the inner side of curves, and everywhere except in the stream bed grass grows more than knee

deep.

Just above the main waterfall I found sugar cane abundant and in bloom. I'm collecting plants to-day if not common elsewhere, which leads to a lavender-flowered shrub below me which I have not yet observed elsewhere. I have not quite enough faith in the strength of my cinet cliff rope to tackle going over the ledge with a hole below me 1,800 feet (?) deep. The altitude here by the barometer is 2,100 feet. From all appearances the river does not descend a hundred feet from the pool in the hole below to the main stream. The roadway opposite was 250 feet elevation. The gorge is of course rather short, but what there is of it promises well for the future eons.

When it comes to air diving, few birds have anything on the swift. I just now saw one drop from above me at least three hundred feet. He twisted somewhat while diving, but certainly let himself out for speed. Nor is the tatler much inferior to the sea birds themselves. One comes down stream over me and then cuts loose, descending not much less than the swift, and directly. Above the second leap of the falls he circles once, twice, three times, gaining altitude all the while. Again he turns loose and descends like a bolt to the verge of the second leap and there quickly rights himself and alights upon the rocks. This reminds me that I disturbed a reef heron from the brink of the second small falls above the gorge. Had noticed his signs all along the creek bed. Why not here are prawns to eat?

When I arrived here a flock of at least a dozen swifts were flying about below the rocks forming this upper verge of the falls. My yodeling scared them away and now the gnats are getting so bothersome that I can hardly write. A green dove or two occasionally flies out from the trees growing on the ledges below. Warblers are down there, and white terns also. The swifts are overhead and everywhere. Had I thought of them I would have had an excuse for this trip on a hunting day. Noddy terns now and then flying about the cliffs, and half a dozen yellow-billed tropic birds observed, their black patches and white tails plainly visible from above.

It is now 4:30 (I'll have to travel to get back before dark) and the swifts are becoming more numerous than ever. No doubt they are coming home from their wanderings over the plains above. I thought for awhile that there was a colony nesting below this fall, but do not now believe so. It is merely a good feeding place, and it ought to be if gnats are good food. My Sunday worship has been fittingly observed to-day. Such a spectacle as this can but make man realize his own insignificance.

Had to run a baby Marathon against darkness on return trip. Cross country races would test the mettle of athletes in Nukuhiva. The well polished bed rock of the stream was none too conducive to speed. I left the vale early and struck westward for the hills, hoping to pick up a good continuous cow path at the edge

of the plain. Had about half success. Struck a trail which carried me half way out of the ravine and then dispersed, leaving me floundering through fern brake to my neck. Made a ridge and again picked up a trail bearing WSW. Gained good time along it, but soon discovered that where the ferns covered the trail caution was necessary to prevent falling headlong into wash gullies. This trail led to one of the main plain-edge trails. In the first ravine head where guava is interspersed with grass the trail spread into a dozen or more feeding paths. Could not see it beyond, but judged where it should be on next ridge. Floundered through the vale, stopping once on the edge of a ten foot drop into a stream bed cut deeply into the heavy clay. This process was repeated at least three or perhaps four times when the real trail was found; and none too soon, for it was then past six, and darkness was rapidly overtaking me. Throwing caution to the wind, I sprinted and soon reached familiar looking territory. Once I struck down ridge to avoid some hibiscus entanglements. The dog went up ridge and I turned back and followed the dog successfully to the main trail through the entanglement and down the next ridge to our own hibiscus grove.

Temperature at 6:40 P. M., 64° F. Barometer 2,650 feet. Made a fire to heat the bean pot and water for a bath, a cold one not being desirable up here. A good hot meal of macaroni, beans and pigeon (the big bird made three good meals, half a breast being

ample for one. Then I changed the the plant blotters and went to bed happy.

September 25

Temperature at 6:00 A. M., 61° F. Barometer 26.50 feet. Two years ago to-day we landed in Papeete. If they had customary success at the north islands and Louis skinned regularly we have killed and put up five thousand birds in the two years. Other than that we haven't accomplished much, unless these notes are of some value.

Up with the warblers this morning at daylight, and after a hasty breakfast went out in the ferns after rail. None were heard while hunting, though one was not far from camp while I was at breakfast. I am after a new record to-day, for I feel certain that I heard flycatchers in the hibiscus during the early morning. I must neglect the pigeons sometime and hunt these hibiscus woods more thoroughly. On over to the trail made Saturday afternoon and up to pigeon point. Killed a swift along cow path in plain region. At pigeon point a parakeet passing set me to squeaking. While I changed from pigeon shot another party arrived on the scene. He was fluttering about in the sunshine, so I mistook him for a warbler at first. Was about to shoot at the hovering parakeet above me when there came from the bush into which the newcomer had alighted the welcome "Serxy-six" of the flycatcher. I changed my aim and obtained a new record

Nukuhiva,--another bird the natives know nothing about. Now I must search more in the hibiscus woods. This fellow is in the intermediate plumage between juvenile and adult.

Arrived here at 8:30,--a very clear, sunshiny day. Not a pigeon heard or seen as yet. Half a dozen doves have flown along the ridge from ravine to ravine,only one being within range. This still hunting certainly would try the patience of a Democratic President. The chief pleasure of it is listening to the warblers and searching for their nests with the field-glasses. There's an old one very much resembling the nest collected on the twenty-second in the upper branches of a slender shrub just below the ridge. I've heard suspicious clucking in that direction, but saw nothing until just now when in the shrub beyond,through the branches of which entwine half a dozen Fregemetia "ieie", I espy the clucking bird and watch him hop up to what had appeared as a clump of dead leaves of that plant. The clump of leaves is apparently a nest. I'm off to investigate it; but it, too, was an old one,--older than the other, in fact.

Three hours now have I patiently awaited the coming of the pigeon. Two birds only have I seen, one soaring southward high up the ridge, the other working northward lower down one promontory above my location. I'm going to lose patience pretty soon and go down into the hibiscus woods for flycatchers and probably rail, though I think they keep well to the densest fern-brakes. An earwig just alighted upon me. It was quite amusing to watch him fold

his wings crosswise by curving his abdomen upwards to tuck the folded wings under the coverts,--one of the odd developments of the insect world. Those insects are quite common in these islands, though I have not succeeded in catching very many. Pigeon calling has irritated my throat until my eyes are running regular stage tears.

Selecting the moment when I was busy at luncheon, a pigeon came over me from the side of my shade tree. The first I knew of it was when a rapid beating of wings overhead announced his departure. Did not get a shot at him. An hour later I saw two birds coming across the ravines south of me. They appeared to be swerving far up hill, and I feared I would not get a shot. I called at length and believe they came down over my ridge to investigate. Got in a long shot at each, but did no serious damage. These Selby shells do not seem to be as effective as the Peters we've generally used in sixes, or else my eye and judgment of speed and distance are getting worse instead of improving by practice. I do occasionally pull some rotten shooting.

The two birds I shot at alighted on trees on the opposite side of the adjoining ravine. One went into the leafy part of a small shrub so heavily that I thought him dead, but later he appeared on a heavy branch beyond the leaves. He broke quite a sizable branch in his awkwardness. The other flew to an open-leaved tree with large crooked upper branches. After about five minutes he flew down to the side of the other bird and sidled up

up to him, making a deep bass "Uh-wah, uh-wah, uh-wah", and lolling his head and throat like an old pouter pigeon. The other bird was crowded off the limb by the performance, and flew to a tree fern, upon the near-by perpendicular stem of which he alighted in an upright position, woodpecker fashion. Later he took a side pose at which he paused but briefly before flying to a horizontal Fregimetia close by. There he made himself comfortable and remained for more than half an hour after the other bird had left. Went in the same direction horizontally around the ridge to the northward. While I was watching the cooing performance another bird flying much too high for shooting passed over me towards the northward, which, by the way, is towards the valley of Tapueahu where the birds are supposed to nest and roost, according to Franc.

At three o'clock two more birds arrive from the north, one getting beyond the south ridge ere the other showed up. This latter alights on my ridge, so I try to sneak up within range, but have little chance through such brush. Away he goes, and a long shot does not reach him. No luck today, and bad shooting. Still, I think I should have dropped those other two.

Returned down trail calling in hibiscus woods for flycatchers. Only warblers responded, save in the patch just above camp where a young flycatcher came up to me. The auxiliary failed to injure him. What odd freak of nature brings about the rarity of

this bird here when at Hivaoa and Huapu they are so abundant? They are here,--why have they not multiplied enough to be abundant? The warblers, on the other hand, are far more numerous than at either of the other islands.

My guide with the young boy (they never will go alone) was in camp, having brought the bulk of my provisions and a load of breadfruit and bananas. Poor fellows! they brought also about 2.5 kilos of hard bread, my one biscuit per man per meal being insufficient.

Temperature at 6:00 P. M., 61° F. Clear and calm.

September 26

Temperature at 6:00 A. M., 56° F. Clear and chilly.

This morning I let Franc take the 12 gauge (one barrel only working) to go to other regions in search of pigeons while I returned to my post of yesterday. Spent most of morning in ferns and woods without result, save the daily swift. At the station luck was still worse. I saw one pigeon over on south ridge, and two flew along at a high altitude. Nothing else. The guide is doing considerable shooting to the northward, with his dog on the chase. A brown phase flycatcher came into the bush above me at my coaxing. Other than that it has been a very disgusting day, accompanied with a continual stomach-ache. Hot and sunshiny with but a few heavy clouds early this morning.

If I was left here to get the pigeon, why in the name of common sense was I not left in the valley where the birds are the most plentiful? Or if I had been given a hundred francs, or even less, I might have hired a canoe to take me around there. Whether to come up here to-morrow or not I do not know. I think I will try it, and with Franc on the other ridge maybe one of us will get a bird. We should carry a .32 calibre rifle barrel on our gun. Two birds to-day and one Saturday could have been reached across the ravine with a small calibre rifle. If we do go around to the valley of Tapueahu I'll take my .22 pistol and will then be able to shoot at longer range.

I heard Franc shooting considerably during the day and hoped each shot would scare pigeons my way, but none came. At camp I found the boy busily engaged pulling feathers off three pigeons, while beneath the tent lay seven more. He had found them eating guava, and had shot all ten sitting. According to the custom here he had aimed at the heads, three of which he succeeded in clipping off, so close he was. I had failed to give him any instructions as to how to shoot. Worst of all, I have too severe a stomach-ache to work on birds to-night. I'll have to remain in camp to-morrow and let Franc try his luck again.

Temperature at 6:00 P. M., 61° F.

September 27

Temperature at 6:00 A. M., 55° F. At 6:00 P. M., 64° F.

Skinned out three birds before breakfast and we find the breasts and legs making as delicious a dish as man ever ate. Franc went off to get me six more birds and all he could to carry below. My stomach-ache somewhat retarded progress, but I did succeed in getting the birds well cleaned of fat and made up before bedtime. Franc returned at four with three more birds. It is evidently nesting season,for the males, save a young bird of last year (?), were feeding young, while the females (with one similar exception) were laying, nesting, or feeding young. He lit a brush fire this morning, which might have scared away the birds.

September 28

Temperature at 6:00 A. M., 59° F. Fog above ridge.

I remained in camp this morning skinning yesterday's three pigeons. After lunch I went out to see if I could find Franc's hunting grounds. Along my old trail while crossing through a guava patch a pigeon flushed, but I succeeded in getting it with a long shot. Hunting would not be difficult here where the guava are ripe, but now it means climbing one ridge after another for the birds. I'm ascending the second beyond the one Franc fired, which was one this side of my old post. Just where the boys are I do not know. The fire followed the dense fern-brake and lycopodium.

How many of the shrubs will survive is questionable.

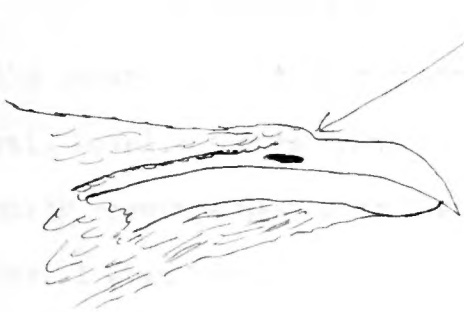
On up the ridge to a hump before a saddleback here at 3,350 feet. I am hailed from the opposite ridge by the boys. They have seen nothing all day. From the point where they are down into the ravine opposite the saddle beyond me stretches a tall growth of guava trees. The valley bottom is filled with this tree as densely as hibiscus grows elsewhere. Spots of yellow reveal ripe fruit, mostly the largest, which proved to be too much for a mouthful even to the Rupi. One of those collected had two guava at least one inch in diameter, and a third one and a half inches in the shortest diameter possible. This fruit could just be squeezed through the clavicle opening. How could the bird have swallowed it unless the crop glands softened it?

The natives shout "Rupi!" as I write, and I see a bird come soaring directly over them. Not desiring to let him fall down into the deepest part of the valley, I give him a side-breast shot and drop him but a few feet over the ridge, whence the dog retrieves him without injury, inspite of tender skin, heavy bird, and dense fern-brake on the steep ridge side. Then a shadow on the opposite ridge announces the approach of a pigeon. He is flying high and somewhat up ridge from me, but I try the one shell in the gun,for swifts about the ridge had kept the auxiliary in commission all the way up. I missed.

Warblers are not as abundant here as they are in those

ravines filled with hibiscus. This guava ravine head is along the Pua line, that tree being here on this ridge, on the ravine walls below me, and up the opposite ridge towards the boys. It is, however, scarce in quantity.

No. 4852



Fleshy knob of three birds was small and undeveloped as here illustrated. Sexual organs in all three cases small, like birds about one year old which had not yet bred.

About three o'clock a bird came over the ridge from behind me. A long shot dropped him into the very bottom of the ravine. I sent the dog down, but he got no farther than the sugar-cane filling the ravine bed. After a second failure upon his part I went down myself. Reaching the sugar-cane after sliding down through brush, ferns and "ieie", I cut up around the main body of it. The dog was somewhere in its midst, howling "bloody murder", as he had done both times he came after the bird. Suddenly I found myself suspended by entangled canes which threatened to drop me any mimute. Through them I could see the reflection of water surface at least four meters below me. On this place the dog had trapped himself, so I had no occasion to get out about his not retrieving

the bird. Calling him, I succeeded in catching his collar when he made a noble effort to scale the walls of his cell. Then with some difficulty I extricated myself. Down the farther side of the cane-brake we found the fallen pigeon, the dog locating it. Thence we followed down the stream bed, which required much brush cutting, an hour of which just about wears one out.

A juvenile (?) brown flycatcher was obtained just above the sugar cane and lost during the scramble down the ravine. No rail heard. I have spent several half hours late of evenings and early mornings near camp listening for rail, but only occasionally have I even heard them, and then mostly just before daylight. They are apparently in the very densest ferns and not in the dark woods. Most of my time, however, has been spent hunting and caring for the pigeons.

Along the trail returning I killed a swift with ten shot. The dog failed to find it, quitting with but little effort to return to the bitch the guide has along. I tried to find the bird myself, but it is hopeless to search for them in these ferns. Another swift I observed carrying a tuft of moss about three times as long as the bird itself. This bird was flying in an airline for the waterfall. Which reminds me of another swift observed at the same task while I was returning from the falls last Sunday. What a long way to carry nesting material! Flight, however, shortens distances.

Temperature at 6:00 P. M., 67° F. Cloudy.

September 29

Temperature at 6:00 A. M., 59° F. Fog above ridge.

These pigeons are so fat that three of them keep me busy for as many hours. The guide takes his twelve gauge and goes out the first thing every morning after breakfast. I tried for rail this morning with no results. After lunch went to yesterday's successful pigeon point, where I have now been some hours without results. Have seen but three birds, all flying high from north to south along ridge. Two went soaring directly along; the other turned at my ridge, circled back and descended, turned at opposite ridge and still descended, turned again at my ridge and then alighted in some guava trees in the ravine head.

Have heard the native shoot twice since I came up here. Since he always waits for a sitting shot he seldom misses a bird. One yesterday flew directly over him, but he merely called my attention to it. He says that with his rifle in Tapueahu valley he has killed twenty-four birds in one day, the birds not scaring at the rifle shot. I think he uses a .32 calibre.

When the third pigeon alighted to-day I spotted him with the field glasses. He sat in the solid branches of one guava for several minutes, turning about two or three times and looking around. Then he flew to a large, low branch of a neighboring tree and immediately from that to a small shrub which swayed nearly to the ferns

with his weight. I saw him struggling with a fruit, or perhaps more than one, for several minutes, after which he flew into the larger tree. Since then I have not been able to relocate him.

Doves are noticeably scarce here. I have seen but two during the entire day, and have heard none this afternoon. An hour or two of cloudy weather now gives way to sunshine and a burst of warbling. There are two doves now rising from the valley below me. Circling and soaring up they go until well above the higher ridge, then off down the other side. This begins to look like a no pigeon day for me. I hope the guide got three or more. We want six more this week if possible.

We now have as many specimens of this Serresius as we have of Globicera. I was hoping when I agreed to remain here at Nukuhiva that I would have some chance of camping in the nesting country and so be able to learn something about the life habits of the birds. This is apparently the proper season too, for all of the females (ten of fourteen) were nesting, laying, or feeding young. Perhaps we will spend a day or two there when the ship returns. I am going to remain up here until word comes from below that the ship is here. There goes the pigeon from the guava and over the opposite ridge! No luck for me to-day! Warblers getting well tuned up.

I caught up with the boys at the burnt ridge and was pleased to learn that Franc had obtained three birds in the fourth

valley farther north than I was. All were again eating guava and were killed sitting. All three were males, one the largest bird yet killed,--an adult in beautiful plumage. My balance stick and two pound tin of oatmeal gave him credit for a full pound and three-fourths. He was feeding young, and had a crop well filled with a pasty substance and a guava half digested. Another was a juvenile bird with plumage decidedly duller than the adult, and fleshy knob undeveloped. All the juveniles have had very dirty feathers on the culmen, which makes me wonder if that has not something to do with the natural development of the fleshy knob which would prevent the feathers from getting into the opened fruit. The cleaner the feathers the more attractive the bird would be when mating. Those birds then would stand the best chance of leaving descendants.

I killed a swift along the trail. At camp I had no success with rail, but just about dark one was heard calling in the fern-brake across the gulley. What chance has one of catching them? The fern-brake is neck deep and dense. About the only chance would be to fire it from all sides and then perhaps the birds would flush. I may attempt such a method, or even tackle cutting away the brush, one lad on each of two sides of a triangle while I guard the third.

September 30

Temperature at 6:00 A. M., 65° F. Barometer, 2,500 feet. Raining. Sent France back down to the village to bring the rest of the food and breadfruit, without which my supplies would last no time at all. What tremendous meals these boys make! Two large breadfruit, three cups of bean soup, one pound of pigeon, fried mush, hot cakes, biscuits,--this is what I remember for last evening. One night they each ate more than two quarts of "taro popoi", a breadfruit, one and a half pigeons, several cups of soup with rice and vermicelli, biscuits and jam. Grease they are very fond of. The first night up here I caught the boy ladling butter onto his plate by the tablespoonful at least three times in one meal. I rationed them then, and since have not left the can open. They have, however, found a satisfactory substitute in the crisco can. The fat from the neck and entrails of the pigeons they take out of the dog pot and render out to mix with the crisco. After an evening meal it is perfectly hopeless to endeavor to get any work from them. It is all they care to do to make down the beds, smoke a pipe and go to sleep. And such a sleep, sound and solid throughout the night! Often they are in the same position in the morning that they had in the evening. Twelve hours is none too long for them. No floor is too hard, no ground too rough,--a full stomach and shelter, with hot tropical climate preferred. Cold nights

disturb them decidedly, at which times they bury themselves, heads and all, in whatever is available.

Heavy rain commenced just after the gibbous moon set last night and continued in spells all morning and most of the afternoon. The rail across the valley was heard several times this morning, but from the densest portion of the brake, whence there was no enticing him. For the first time in his twenty years Franc heard the clatter of the rail. Or was it that for the first time he observed it? The piping he blamed upon the warblers, but finally a long, clear clatter convinced him that the brush really held a mysterious creature, and he took my word for it that the exuberant, defiant noise emanated from a rail. If the ground were level here I would try tunneling a lane through the brake. If shaded over the bird might step out in it. Open lanes have proved utter failures. Calling gets nothing but defiant replies occasionally. Tonight I was blowing a horn when several replies came from the brake. It was then too late for shooting. I am quite determined, however, to attempt cutting around or burning around them Monday.

Skinning the pigeons and swift occupied most of the morning, and the plants the afternoon,--what little my stomach let me work. During the rainy spells the warblers quieted down almost entirely, but at the least lull in the storm they were out and singing with all the more exuberance and joy. In the evening they were

particularly joyful and happy.

October 1

After yesterday's rain and a lengthy shower during the night a clear morning was announced at early dawn by the devout warblers at mass. What glorious singers they are, and how abundant here in Nukuhiva! This morning I heard nothing of his majesty of the underbrush, not a pipe, nor a clatter,--perhaps because the warblers' singing smothered everything else. How happy they are that this is going to be a day of cheerful sunshine with plenty of insects about! Is it any wonder that much of mankind emerged from the oblivion of animaldom as sun-worshippers? Many of us still are, and go about with a terrible grouch when the weather happens to be stormy.

Soon after the sun had risen the warblers set about their breakfast and the only noise that is continuous is the roar of the wind passing through the brush on yonder ridge. It sounds like the roar of a large waterfall about half a mile distant. This waterfall, so the boy Franc says, when flushed by rains and when the tradewind beats directly against it gives a periodical booming like the rapid firing of a huge cannon. This is caused by the gusts of wind checking back the sprayed water along the cascade of the first hundred feet until too much volume accumulates for the force of the wind. Follows then a plunge and boom.

The flies and gnats and mosquitoes are also around for an early morning breakfast. My ankles and forearms get some terribly itchy spells, but I refrain from scratching, and if anything seems necessary let a little rubbing suffice. Even that is sufficient to raise large welts where each gnat has dined. They crawl in under one's sleeves or trouser legs and are very persistent. Life about camp is perfect misery for the dog on account of them.

The parakeets are up and squeaking already this morning. One thing I forgot to mention about my natives is that they have an uncanny knack of using up all the water in camp and leaving the pots empty. Also at their departure yesterday I found the woodpile practically used up. They have no concern for the future,--the present is good enough for them.

How prominently a prolonged rain brings out the lower plants! The lichens swell and the mosses and liverworts freshen up conspicuously. These horizontally inclined hibiscus boughs afford good footing for such plants and are most thoroughly utilized. I never before noticed such a profusion of them as there is upon this tree above camp. Epiphytic flowering plants are noticeably absent here; lichens abundant. The most conspicuous moss is a reddish brown colored one which stands out from the tree an inch or more.

October 2

After fruitless efforts to coax the wary rail from the

fern-brake this morning I cut two cross lanes through the region whence the calling came. Tunnels were unsuccessful from an engineering as well as from a hunting viewpoint. The cross lanes may prove successful. If not, I'm going to try a little firing of the brake. If there be not a high wind one might keep ahead of the fire and get any bird that chanced to flush or cross an opening. If birds were more numerous I'd try cutting the brush in squares or triangles, but they are decidedly scarce from all sounds.

The rest of the day I spent in the densest hibiscus glades I could find without any success as to rail or flycatchers. One brown flycatcher came to my calling, but I gave him too much of a sporting chance to escape. A few doves about here, one of which I obtained. The white terns hovering overhead, but I have been unable to locate egg or young. Warblers as customary and singing as usual. Only one or two swifts observed today; none obtained. Did not go up high enough for pigeons.

The natives had dinner ready when I returned to camp. They had met a native who had killed a calf, so we had veal cutlets for dinner. The boys devoured a whole frying pan heaped full of meat and at least a quart of popoi each, a breadfruit, and biscuits. How do they do it? The boy is snoring upon his full stomach now. They have brought up sufficient breadfruit to last out the week. My provisions will just about hold out that long with a few things left over, but not much unless we have pigeons all the time. This

leg of calf helps amazingly and tasted excellent. I'm proud of my stomach so far. It appears to be going to handle the grilled meat I ate.

Spent an hour at the cross lanes this evening. Heard one distant clatter but nothing more. Warblers set up quite a chorus just before setting of the moon last night, or early this morning; also rails clattering then sparsely. Yesterday and today I found a yellow striped beetle in pairs on our dish and food stand. The movie film cans I obtained before we left Papeete are ideal for packing away papered insects. As they are ant proof one is encouraged to collect insects. Ants formerly got away with most of the bugs before I got them tinned. A mothball in each can would help some. Today I found a cluster of orchids similar to those collected on ridge summit, epiphytic on hibiscus here just above camp. There is a clump of bamboo here too.

BOOK XXXII

Second Cruise of the 'France'

to

Nukuhiva, Hivaoa

(Marquesas Isles)

October 3--November 7, 1922.

October 3

Light showers during the night and rain threatening for today. Held the boys here for an hour or so while I tried firing the fern-brake across the gulch. Dampness preventing any rapid streading of the fire, I let them go after pigeons, remaining myself to try to rout Meho from the brake with small stretches of fire. Seeing three parakeets in a tree a little

distance off I stalked them and obtained one. The fire attracted a brown flycatcher. Franc says he sees them occasionally, but never yet a black one. Gave him shells for small birds today. I think I shall follow this scheme throughout the week, keeping after small birds myself and sending Franc after the pigeons. The boys located a nest of young warblers not far from camp this morning. Had it not been stormy we would have moved camp today nearer the guava patches where the Rupi have been most abundant.

After an hour or two in the hibiscus woods, during which no sign of birds other than the warbler were observed, I decided to go after pigeons also. In the botanical line I found a tree of extremely soft, almost pithy, white wood with huge leaves,--no fruit here. Franc calls it "Buka". Also found an orchid beautifully in bloom, the flowers being almost translucent and very pale green. Several here are epiphytic upon hibiscus trunks. The "Kava-kava", which is very abundant all through the hibiscus woods, I here found in fruit for the first time in Nukuhiva. I struck past camp and down the foot-hill trail until beyond all signs of the boys, then took up a ridge with deep ravines on either side. Obtained two parakeets, one young bird with little white on him, who leaked out through the hole in my jacket. Plunging through this brush tears these old and rotten jackets rapidly into holes.

While calling parakeets two brown flycatchers came up out of the ravine. I had one spell of cutting through typical

"ieie" with guava included. Just above here I found the "Pimata", a plant with very pungent leaves when crushed, which Franc says Brown was unable to find. I have collected additional specimens of it. Altitude by barometer, 3,350 feet, with 150 to add for drop since reaching camp from sea. Here I camped on a lump of the ridge just below the fog when not within it. One pigeon crossed just beyond range. Not long thereafter I heard Franc shoot. Rain commenced at three o'clock, so I hallooed the boys and we went in. They had three birds, but one which was Franc's first wing shot had all the abdomen torn out of it. He says it was less than five meters away.

To-night when I asked him where we were going to move he told me of some stretches of real marshy land where the old man says the Meho ("Knau") is found. (But as I write this one day late in new camp, the bird of that name, which is heard only at night, makes itself known with the familiar night call of Pterodroma rostrata.) Now I have something else to search for. How much better is this hunting than putting out a boat and killing thirty or sixty birds, and then spending a day in the hold! One learns something about the habits of the bird when one listens to them for several nights and searches for them for weeks, or even months.

October 4

This morning while I skinned pigeons the boy brought in

a nest of young pin-feather warblers. I photographed them profusely before killing them. He found the nest not far from camp yesterday, when it contained three birds. To-day the smallest was dead in the bottom of the nest. While photographing them I saw one of the birds back up, and, rearing its stern above the nest, excrete over the rim. Instinct perhaps; is it inherited or learned early?

There were several showers this morning, but fortunately none during our moving to the marshland. Just before we reached our destination the dogs went off on a pig trail. I let mine go along and he covered himself gory. Franc said he was more than enjoying the fight when he killed the pig,--a big sow which he carried up to the trail, Noha leaving him to bring us the news at that point. I found the marsh and had located camp when Franc arrived. Our trail followed the ridge betwixt the central Haukaui stream, which has a deep, well-vegetated valley, and the west one, or cascade creek. Warblers were singing as we came along. A few white terns about, and a few doves seen. Only one swift seen, and Franc had the gun after pigs at the time. First call of the rostrata shearwater shortly after seven P. M. I am somewhat at a loss as to just where to look for them, though there are many places they can alight.

October 5

A rail! A rail! My contentment is a rail! Aroused this

morning at 5:05 by the challenging clatter from the marsh, I and my good hound, Noha, donned our wading shoes and proceeded thither. Several times I heard him safely within the cover of the tall sedge, mockingly piping at us. Thereupon I conceived the idea of going in after him. Wandering around in there I noticed the dog sniffing considerably. Half an hour or so later he became very excited about a clump of ferns growing within the sedge. In a similar location I had already found an old nest. So now all expectant, I take up the slack in the trigger. Came a flutter. Bang! Revenge is mine! For once I've killed a rail on the wing! Again the dog, the most useful auxiliary to bird collecting, located the fallen rail in the dense sedge. I can see no difference in this bird from those from Tahiti, Rapa, Gambier, Marutea, and Tubuai. Their calling is very similar, save that only in Rapa in April have I heard the low-toned whimpering which I then thought coaxed them curiously into range. Nothing but large series can prove their differences, and a series of rails means months of concentrated efforts. This Marquesan record has the iris and orbital ring bright cardinal red,--exactly the color of the labels on Bauer and Black absorbent cotton cartons, Pat. Aug. 19, 1913, per attached exhibit. The legs are more difficult to describe, but here's a fair color chart at as well as on hand. Large scales on shins and upper toes and in rear of approximal tarsal joint are dirty like my finger nails after digging in brick red clay. Fore part of said joint a dull vermilion, sides of tarsus and toes brick red, under parts of toes and lower rear

half of tarsal joint like my dirty palm. Also obtained two swifts this morning, one flying above the marsh where insects appear to be abundant, if the spider webs glittering in the morning sun are a criterion. I counted seventy-one mosquitoes in an occupied web,-- a goodly night's catch for one spider!

Since returning to camp to breakfast upon pork chops and breadfruit I have killed three curlew, and one more came along about noon. That is the kind of hunting for a rainy day such as this has been. I remained in camp caring for specimens while the boys endeavored to bake the pig, but rain prevented. A leg boiled with beans certainly went well this cool, damp day.

At five o'clock the rail commenced clattering again, there being a lull in the storm if it be not finished. Went out and at the edge of the swamp held a whimpering conversation with two birds. Sent the dog in and although he worked like a thoroughbred he failed to flush the birds. Hearing some more farther down the swamp, we worked down there. I never dreamed of the dog's doing so well. Nothing more could be asked of him than work, and he certainly worked until dark.

Piping and clattering continued by moonlight until seven o'clock. At 6:35 heard at least two P. obscura ("Kako") pass over the island from north towards the south. No sound of rostrata as yet. And none heard during the night. This evening

the clouds looked as if they were dispersing, but later on during the night an even blanket of cloud announced uncomfortable rain for the morrow. Rail called until after I went to sleep.

October 6

No sign or sound of rostrata during the night. Island enveloped in low lying mist this morning. A few warblers singing. Went out after rail until the boys had breakfast ready. But one bird heard all morning. The dog worked splendidly, but failed to get a rise. How pleased I am with him! As I write this tonight he is barking at some supposed disturber of the night. I think a pot of bird bodies boiling for his meals started him, and from the sound, his own echo is keeping him going. Still, in a land where one tribe fought and ate another and all joined in feasting upon "Popa", it makes one think a little, and in spite of modern civilization one is inclined to put buckshot in the handy gun.

While out this morning a flock of six or seven golden plover flew about, calling considerably. Could not entice them within range. Later on while at lunch a lone bird came within long range, but I failed to drop him. There are several places about here where open miry ground exists with nothing growing but a very thin-leaved, low sedge and mosses and algae,--good plover country. When I shot at the plover three curlew (25) took wing from the ridge opposite and came my way again and again until I

finally succeeded in killing two of them. What a curse to be upon a meatless diet with such game birds coming to the camp door, and pigs and beef for the shooting! The Frenchmen claim that although the beef belong to the natives this land up here belongs to the conquering government, and hence they tax each slayer of a beef one hundred francs. The march of civilization is onward, but in which direction? As for my stomach, I had hoped that two or three weeks of mountain life would bring about some slight change for the better. Nothing but the prescribed diet is digestible, however, and every attempt at eating meat means misery. Even the diet is accompanied by cramps that take all the spirit out of me.

After lunch I followed the trail of the cattle leading down the vale towards the mountain, which forms the north end of the range crossing this island on the west. Passed through some very interesting foliage. The marsh sedges extend but a kilometer or so and are nowhere a hundred meters wide. Small patches with beds or islands of ferns where the ground is the least bit above the marsh. Fern-brake covers vale and ridge practically everywhere, save for the marshy sedge patches and wind-blown ridge points. The usual red-stamened shrub predominates, with the edible berry more common than usual,--the attractive parasite observed the first day upon ascending to this plateau is here. It grows like a branch of the tree itself, but is usually larger a short ways from the shrub than it is nearer it. The flowers are a brilliant red and very

attractive. I found the large Freyemetia abundantly in fruit. The pandanus here seems to have much longer and more slender leaves than usual. With the help of the dog I caught what looks like a Polynesian rat, and just before we reached camp he caught a mouse. Hearing a rail in the ferns beside the trail I tried conversing and coaxing for about fifteen minutes, then put the dog in after him. His work was splendid, but the brush was too heavy for his success. The same was the case later at camp when the only birds heard were in exceptionally heavy fern-brake below the sedge swamp. Our work yesterday seems to have scared them out of the swamp. Warblers were singing all along the route to-day, and many fledglings were heard calling for more food. A couple of white terns were the only other birds observed.

It is now 7:30 and no sound of shearwaters of any description. My observations to-day convince me that this rail is no lover of rainstorms. No birds were heard during showers, and no such clatter occurred after dusk today as we heard yesterday when the moon was shining. The warblers held up well during the showers today. The cloudiness has little effect upon their happiness. The minute the actual rain stops they burst forth in gleeful harmony everywhere. Some continue to sing in spite of rain. Often a lone bird is heard during the night. They certainly commence singing at the very first sign of dawn. Heavy gusts of wind this evening, which I hope presage a sunny day to-morrow.

October 7

No sound of shearwaters throughout the night. Clouds broken up and considerable moonlight. Day dawned with sky overcast. Rail not calling much,--once or twice their clatter was heard. No results from promiscuous hunting. Spread birds to dry and changed plant blotters before leaving to explore the mountain nearest here at this north-east end of ridge. Trail along ridge divided by Typee and Haukaui upper valleys. Much guava, and frequent hibiscus groves. Obtained two beautifully plumaged doves in a guava swale. Found this east face of mountain altogether too brushy, so swung over to some hills that showed low jungle. No trails leading up them because of their isolation. An interesting example of stolen stream beds here.

Here at 2,750 plus 150, making 2,900 feet are the "pua", lobeliaoid, auti, small Freyemetia, and other vegetation found higher up on the other ridge. In the jungle where I turned back on

the windward slope was "primata" also. Brown certainly didn't ramble around much if he missed that tree, for it grows here in several places. Three times now have I come across it. Cattle are about here much more numerous than elsewhere that I have been. Dog had a chase this morning. There being no guava on this mountain side, I do not anticipate the Rupi's being here. Have seen nothing of them during this rest at a point commanding a splendid view of the entire side of the mountain.

Warblers singing and feeding squawking fledglings. No flycatchers or parakeets observed since moving camp; swifts more scarce here than formerly; white terns fluttering about the trees up the mountain. Have decided to forget this hill and return to the rail marsh.

Along the route the dog left the trail and soon I heard him baying game in the valley below. The rushing growl of a pig announced the nature of his quarry, so I went down to encourage him. The pig was at bay in a dense thicket of tall ferns where human progress was much impeded. I approached until I could see him; then I fired at about ten yards distant, aiming at his forehead. Never phased him! He went off on a mad lope, the dog in hot pursuit. Half an hour later the dog returned, but showed no signs of blood, so I guess the pig escaped unhurt. Here is perfect evidence that wild pigs have no effect upon rail. Rail are more plentiful here

where the pigs run wild than elsewhere; the bird is not known down in the valleys where Franc claims cats run at large. Nor are rats to blame for exterminating this bird, if it is being exterminated, which I doubt, for over at the last camp a Norway rat was obtained. I think perhaps fires of the fern-brakes would do more damage than anything else. I tried some small fires to-day while the ferns were still too wet to burn well, but flushed no birds. They would probably flush to leeward anyway, where the smoke would seriously interfere with shooting. I then cut a long lane through the brake where the only birds heard last evening were located. Sat there making funny noises for several minutes, then came down here to the stream below the marshes, where it flows over hard, clay beds,-- really rock with the outer weathered coating of clay.

Along the trail to-day I found a tremendously heavy rock which I could break only with considerable effort, seams of metallic appearance which resounded much like a slug of iron does when struck. I thought it too heavy to bring in, and doubt if it be anything but iron or some other common mineral. The surrounding soil being very red suggested iron in the vicinity. In fact, two other rocks in the trail there were quite the reddest I've seen, like Venetian red pigment. Hearing no sounds of rail down here in the fern brake I'm going up to the marshes for the last hour of daylight.

Forgot to mention that upon arriving at the barren marsh

spot below camp four curlew raised. I was carrying a log of wood and could not raise a whistle to save me. But I got one of the birds as they left. Let the dog carry it to camp, where I ate one broiled this morning over the bed of coals. They certainly are splendid eating.

The marshes were no improvement; I think the birds have vacated, due to too much dogging. I don't blame them; being dogged about is as unpleasant as anything in the world. Heard one rail in fern-brake beside marsh and conversed with him at length, but to no avail. Put the dog into brake, but could not raise him. Nothing else heard during evening. I don't remember having recorded the whimpering here. Have heard it half a dozen times. It is just like that at Rapa.

I am inclined to believe that the murky, cloudy weather has something to do with the quietness of the rail during recent days. The one evening that was clear was well filled with drum trilling and fife piping. These other mornings and evenings have been cloudy with frequent showers, which I believe is responsible for the quietness. No sound of shearwaters late this evening.

October 8

A little sunshine to-day permitted a much needed drying of birds and blotters. But one or two calls of rail this morning.

Of chief interest were the curlew. A flock of three at first, which I greedily appropriated for broiling purposes (I find I can eat a little dry meat grilled). Next one or two solitaires, and later a flock of five which flew around a dozen times or more and then alighted in the open bog. There I found them when going down to bathe. They were not so wild, letting me approach within twenty-five yards, then running off to the edge of the bog. When the fern-brake prevented further fleeing they took wing, circling near-by as I whistled "Kimm".

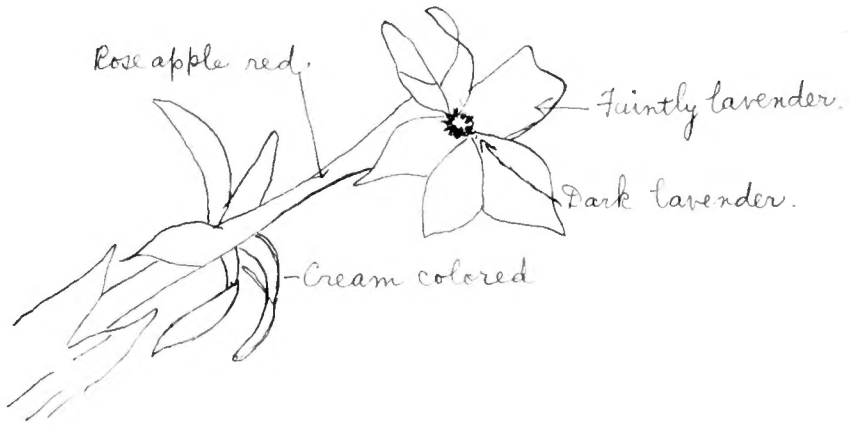
October 9

But one or two calls of rail last evening in spite of good weather most of day. The evening was very cloudy and threatening, but no rain fell. The moon broke through the clouds considerably during the night and early morning. Some rail, one or two, were calling at daylight, but none were heard from five till seven-thirty while I was in the marsh with the dog, who was working well. When at breakfast, a bird clattered in the ferns between camp and the marsh, but we could not scare him out.

I have taken a northeasterly course this morning to survey the ravine heads above Typee for bird life. Even the warblers seem less abundant than elsewhere; one dove has been observed; three white terns above the trees; still no signs of flycatchers

or parakeets; swifts very scarce,--one or two seen daily. Here the pandanus trees are more common than elsewhere and form a conspicuous part of the foliage. "Pua" present and tree ferns more abundant than usual. The Freyemetia seems to more nearly approach the small variety of the high ridge than any observed elsewhere. There is a great deal of variation in it, and after all the dwarf variety may be physiological. The length and size of leaves as well as fruit and stem range widely.

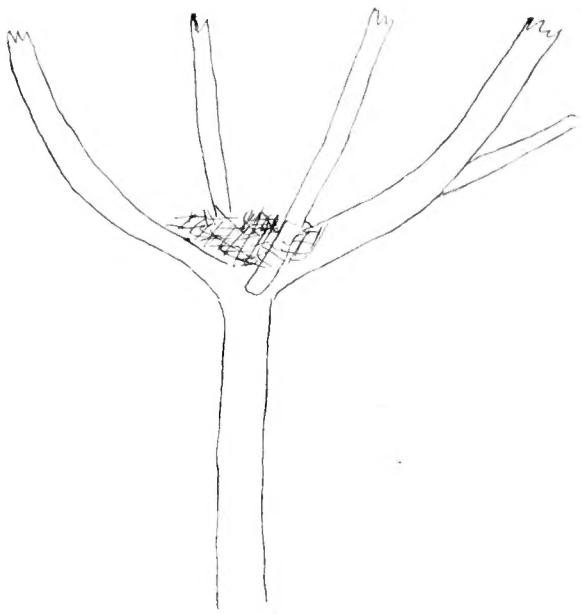
At last the flower I saw below the waterfall! Leaf scars and stems and fruit exude milky, sticky fluid.



In collecting it I find a handful of twigs (38 in number) placed in the "palm" of a branch where five branchlets emerge radially,--very characteristic of this shrub. In all

appearance it is a dove's nest, but no evidence of the birds. It is evidently an old one.

Diagramatic drawing of dove's (?) nest.



I had hoped to be left in about the most thickly inhabited bird area of this island. I see no reason why I should not have been left over on Tapueahu where I had hoped to find not only the white cap's but also the pigeon's nest. Where the birds are as rare as they are here one can hardly hope for any better luck than this. How unsatisfactory is this working under orders! A scientist, like an artist, should work upon his own time, if possible. No man ever created his best work while under obligations to anyone else. We may do average work better than someone

else, but when there is always that driving thought behind us, that we must produce so many bird skins in so much time or for so much money, what chance has one to turn himself free upon a search for nests? Again as to life habits: a bird collector is little likely to learn anything about a bird except how it acts when flushed or called. Throw away the gun and ammunition and let me have camera and binoculars instead. One or two specimens in cases of any doubt as to specific identity are desirable, but not this mad slaughter of forty birds a day. John Muir once remarked that "Nothing is well done at forty miles per day." I replace miles with birds and include "nothing scientifically". My dissatisfaction with this expedition (which no doubt has brought on the nervous indigestion leading up to my resignation) is the result of the predominating rush for skins at the sacrifice of all notes and information regarding the living birds. It may be good collecting for museum purposes, or systematic classification, but it does not give me the scientific study and reflection which alone can keep me contented.

Wandered around through the head ravines and back to camp at noon without seeing any bird of particular note. Heard a few warblers, and occasionally a dove. Certainly no flycatchers or parakeets are here, and few swifts. Called for rail thorugh fern patches without result. Found a few interesting trees, shrubs,

and ferns. A banyan tree had no sign of flower or fruit. Put blotters and birds to dry in the afternoon sunshine while I do a little photographing about camp. I need a good tripod and a different camera than the Baby Graflex for this style of work, yet do not want one quite so heavy as a 5 x 7; am of the opinion that a $3\frac{1}{4}$ x $4\frac{1}{4}$ or at most 4 x 5 would do.

The evening rail hunt was fruitless, as usual. There is a great deal of pleasure, however, in watching an energetic bird dog at work. Noha lapped up the scent from one end of the marsh to the other, but failed to rouse any birds. As darkness fell, one mocking clatter came from the fern-clad hillside beyond the marsh. Heard nothing of birds of any sort during night.

My natives failed to arrive to-day; if they desert me I am indeed marooned. There is no variety of grub left, save one can of jam and the sugar, and the auxiliaries are all cleaned up. Some breadfruit is holding out well, but it gets fearfully dry to the mouth, which, however, is best for my indigestion.

October 10

Barometer, 2,555 feet. Showers during night. Rail heard before daylight from marsh, but the morning hunt revealed nothing. They seem to have lost their curiosity concerning my noises. After breakfast I struck the trail for the mountain ridge,

deciding to try for pigeons at about opposite their home valley of Tapuealua.

Two hours of brisk walking along good cow paths have brought me to the foothills. A deep gulch through a guava swale is bordered by a couple of "Pua" trees with young saplings growing well out in the guava swale. The largest trees are ten meters high and twenty centimeters in diameter; the bark is gray and somewhat warty; wood, white and rather soft, similar an inch deep; milky sap flows freely where cut. Here also is a "Buka", the broad-leaved tree, and sugar-cane. A very few ripe guava in the swale, but none sufficiently enticing for eating.

No birds, but a great day botanically. At the banana grove, bearing plant 27 centimeters in diameter, 75 centimeters high, 35 centimeters at base, 5 meters high to basal joint (?) of fruit cluster. Eight growing leaves slightly over three meters from stem to tip. Fruit one meter long to lowest banana; blossom and stem, 70 centimeters long. Clusters of fruit from base towards blossom. The skins of first few bunches in a few cases turning yellow, otherwise all green. Elevation 3,100 feet. I have several shrubs and trees to collect on return trip, among them a lobeliaoid very similar to the purple-flowered one of Huapu which Brown claimed to be a good find. Also another milky plant with odd flowers and fruit upon stem below leaves; and half a dozen other new plants to

my collection. A botanical collector must not only visit every island, but at least representative areas of each island, and preferably every valley and ridge of any extent. The foliage here differs so much from the ridge ascended last month to the summit that I long to go on up five hundred feet more, but unfortunately I am not the possessor of that old subject of a jocular song,--"My Steam Arm". A plant collector in the tropics needs a good steam arm to plough through brush.

Doves are here in pairs soaring and flying about with joy. It is also good to hear again the squeak of the parakeet. No sign yet of pigeon or flycatcher. Some rat dung on the bananas suggests that the pigeon is not responsible for eating the green bananas. A close survey of partially eaten fruit shows that "iuri" and not "rupi" is the villain.

The blue ternlet is called "parara".

It was a great day indeed for trees and shrubs. "Pua", lobeliacid, banana, and half a dozen other shrubs and trees were found in fruit; in fact, I collected eighteen numbers all told, but that includes several mosses and a fern or two. Coming down the ridge where it was steep and footing treacherous the dog attracted my attemtion to a pigeon that had crossed the ridge ahead of us. It was too far away when I saw it. I "nawed" and was gratified to see it turn back. So I "nawed" again, but it alighted on the tree down the ravine slope. I dropped plant-

loaded jacket and raced back over a knoll and down a shoulder of the ravine. The bird flew out too far below for a shot, but alighted across the deep ravine on opposite ledge. Approach only practical by going down and up other ridge. The bird flew before I got down off my ridge.

I then hastened homeward. The dog was incessantly trying to go off on cattle scent. In a hibiscus grove as I hastened along there was a startling crash of brush and a streak of white disappearing into the thicket some twenty meters away. I let the dog go and he had a delightful chase. Somewhat later I could see across a ravine to where an old bull (all white save sides of neck and shoulders, which were black) was walking unconcernedly along the trail with Noha yapping at his heels. I shouted and he broke into a trot down trail towards camp. When I arrived at the lower end of the marshes there was the bull at bay with three dogs safely off a few meters barking at him. He rushed Noha when that courageous pup approached too near. There also were the natives,--the boy a good three hundred yards nearer camp beside the largest tree in the neighborhood, Franc with the 12 guage trying to get a shot in, but not approaching nearer than the nearest climbable tree. We called the dogs off eventually and went on in to camp. He had good horns and a vicious expression.

Franc was laid up yesterday with a festered toe and it

is still quite swollen. After dinner of breadfruit, salmon and rice I had him name the plants in the press. There were several he did not know, some very common and prominent shrubs. He reports two ships at Taiohae; one he thought the 'France', but they would have sent word by road if it were they. There has been a constant heavy roaring of the distant billows lately. Franc reports a rather high sea at Haukaui, a harbor very dangerous to leave on account of head wind. He could get only biscuits at the store. Well, we have enough for most of this week, but will have to go down about Friday or Saturday at the latest. No rail heard tonight.

October 11

The blue parakeet in Nukuhiva is called "Pihiti"; the flycatcher is "Patiotio"; the tatler, "kiwi"; the curlew, "Kioi"; obscura, "Kako"; rostrata (?), "Kuau",--lives in holes in ground.

Franc's foot this morning prevents him from going after pigeons. After spending the morning in the marsh I came to camp to pickle banana and care for plants, there being two-thirds as many specimens as blotters. Sunshine and frequent change today will start them on the road to dryness. One banana blossom (outer cluster of flowers and inner portion) and one fruit pickled; other flower opened and spread in two papers to press, fruit sliced

and pressed. Am going to pack up the tent and birds, and after starting them down the trail try once more firing brush to rout out the rail. On second thought, though, I'll do no such thing. If they can't be caught decently I'll not destroy the foliage to get them. It does make me angry though to spend a week and get but one bird.

The trail leads along the ridge dividing this west and middle forks of Haukaui, over many little camel humps and saddles ranging very closely to 2,500 feet all along. Where we cross the river it registers 2,050 feet today. This is the largest and middle fork. I am thoroughly convinced, though perhaps erroneously, that the general level of the upland of Nukuhiva represents a peneplain which had the country looking about as now with broad undulating valleys only a few hundred feet lower at their mouth than at their head. Mona Tapua, with its strata of volcanic rock dipping westward, probably represents a tilting of that portion beyond it during subsequent uplift of two thousand feet or more, for since that event either the land has sunk or the ocean raised, drowning the young gorges that are being carved inland from the sea along the old river courses. One strong evidence of former peneplanation is the widespread finding of well worn stream bed pebbles now resting on the surface of knolls and hillsides where no stream has been for eons.

Up over a small fern-clad ridge and down into east

creek; then up again over fern ridges where two swifts were killed and one found by the dog. Over the shrubby ridge where parasitic plant (Number 1269) and its host are most abundant and down wind-swept, rain-washed ridge trail to the Niau House of the guide. From there in the evening flocks of swifts were observed flying about in close groups and squeaking considerably. Sucking noises brought a flock of over fifteen above the house, but they were too high up for even the large shells. Once they came low when first called, but their flight was so rapid and quixotic that I failed to get a bird. This flocking the guide says is an indication of rain during the night. The chances of a true prophecy are good in Nukuhiva where it rains about nine nights out of ten. At any rate it did rain heavily and considerably this night. A curlew (26) about here. Doves, warblers and white terns as usual.

No sounds during the night save what sounded like a tern, probably the gray-back, O. lunata (16)[1], which approaches the kavika in other respects, but from which I have heard little calling anywhere.

October 12

Heard roosters crowing this morning from hibiscus woods in near-by valley. The curlew too was about early, with warblers at daylight. The latter are not so abundant as above.

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[1] Numbers in parentheses refer to birds as in preliminary report of 1921.

Noddy terns flying above the ridge from the cliffs of the gorge.

Breakfast this morning just about cleaned up my provisions. Salt, tea, coffee, a little oatmeal and less rice comprise all that's left of them. I am now completely at the mercy of my guide. Being without money is more humiliating here than it is in America. There one merely becomes a member of the class of unemployed; here he sinks below the status of an uncivilized race. Such a condition, if there were naught else, is sufficient cause for leaving the expedition. I can "bum" and be independent, but there is no pleasure in having to beg and at the same time be tied down to a task. The three weeks in the mountains has accomplished considerable with my stomach, and has firmly settled my resolution to leave the expedition as soon as I honorably can.

The old man says the "Meho" is not the "Koau", which is twenty-two centimeters in length by his measurements, bill forty-five millimeters and the same shape as rail but larger and red; eyes red, legs and feet yellow, feathers black, with a frontal shield of white at the lower throat. Orbital ring large and red; body as large around as the curlew. Is it gallinule or ground dove? The name "Koau" resembles the one call of the bird given singly. In "Uauka" valley his dog caught one on brush not far from village thirty-one years ago, along road between here and Taeohae. The old man also claims that the flycatchers (Patiotio) dwell down in the valleys; that they are black and some have white

tails. Then he claims in addition that there is a "Kokohuia", a black bird the size of the flycatcher. "Pihitikua" is the parakeet.

It was very interesting to note that even the old man, fifty-nine years of age, knew not the names of most of the plants collected from high up on the mountain ridge. Time did not permit getting through all the plants.

October 13

Comes this morning another man to see the "Meho", which has no known name here, and reports that it is not the "Koau" which he says is a larger bird with large red eyes, dwelling near the water, and living in a hole in the ground. They, he says, dwell in "Hatiheu".

Skinned birds and changed blotters this morning, going out in the afternoon along the trail where the swifts were so plentiful yester-eve. Obtained two and a tatler outgoing and expect several more about towards evening. Last evening I was quite surprised at the continuous flight of incoming noddy terns, not in any very astonishing numbers but continuous for about two hours before dark, mostly flying at a high altitude. Many swifts were also observed above the east valley wall. White terns (24) and yellow-billed tropic birds (36) conspicuous against shadowy western

wall. Heavy showers passed over this morning.

My host is certainly a prince and rates every franc he will receive for his services. He is not only feeding and housing me, but is doing both well. Breadfruit, bananas, and taro are the standby at table. He adds hardtack, butter, sugar, and milk and keeps after me to let him get beef or kill a chicken or small pig. It certainly is humiliating to be thus thrown upon kanakas for food and lodging, but Franc's a good scout and takes my word for it that he will get paid. The worst effect is upon my own pride and indignation.

Again this evening the swifts were flocking, circling and squeaking, a sure sign of rain; and it surely rained during the night,--good, heavy downpours. While it was raining I wondered if the flocking occurs during the so-called dry season, or is it not likely a mating flight? If seasonal, then it is easily accounted for otherwise than a preliminary to storm. The flocking occuring regularly every evening would give nine chances out of ten that rain would occur during the night. At this season it rains about that frequently.

No natives gathered about this evening, so I was unable to get more names of plants. The old man greets me with "Koau" whenever he sees me.

October 14

Was skinning out last evening's catch when Louis arrived at nine. The ship is not entering this tortuous harbor in such a wind. It seems that they had a little trouble with the engine in going out, a short circuit which was easily found however, and the catastrophe of striking on the dangerous point of rocks was narrowly averted. How far out do they stand for safety? We row more than an hour before they come in to pick us up. It feels like getting home again after a trip into the country. There is something about the old ship that appeals to me in spite of my little troubles, which are at times magnified by circumstances into seemingly unpardonable offences.

Lunch over with, I began to feel the weather, and was even forced to recline during the afternoon to avoid seasickness. Coming aboard upon a rough sea after nearly four weeks ashore has an ill effect upon a fellow. My three weeks' catch was not satisfactory, but one cannot put up fifty birds a week where the birds have to be hunted as they had to be in that region. Warblers yes! that could have been done, but I deemed it more important to hunt rarer birds than to remain in camp skinning warblers. I did no night work because I had my health to restore, and found relaxation after dinner essential to it.

October 15--Taiohoe Bay.

I asked Mr. Beck why I had been left penniless. He supposed I had enough money of my own to meet any necessary requirements. Well, perhaps I should have had, but had sent all to America before leaving port. My anger calmed down, and careful consideration decided it best to state my condition directly to the museum and then leave action until hearing from them regarding the future work. I offered to go on as assistant bird collector and botanist, with certain privileges of note-taking which have been impossible due to the pressure of bird skinning at one hundred per week or over. The day was spent at letter writing. A sanderling seen about the bay today.

October 16

Went in the whale boat this morning out to the islet eastward from entrance to this bay. It is disconnected from the mainland by a small breach in the rocky wall that forms its body. On the windward side are high, undermined cliffs, but to leeward the sea-shelf is nowhere over six meters in extent and the cliffs not more than twice as high. One possible chance presented itself where access to the tussock-covered slopes above seemed feasible. A low point in the cliff was picketed by a prominent pinnacle of rock. My cliff line fastened to a boulder was heaved over this and the boulder firmly caught in the rocks beyond, affording a hold that bore my weight. Then an oar was banked against the

cliff where a shelving rock afforded safe footing. That part was easy, but after leaving the oar considerable caution was required to make the next stage of about six feet. By the aid of the line I drew myself up and was securely above the ledge. Blouse and gun followed on the end of the line by the aid of the old man of our crew,--the one who went mountaineering at Huapu.

The summit of the island was covered with a light, clayey soil and tussocks of grass about fifty centimeters in diameter, and from fifty centimeters to one meter high. The old grass and roots formed a dense mass in which rats or mice lived abundantly. Tufts of recently pulled grass were tucked into small holes on top of the tussocks in the oddest manner, the evident work of a rodent but not in nests, and odd here where no seasonal growth demands storing of food. One heart-leaved hibiscus (?) grew below the upper cliff on the windward side; two low, shrubby, coarse herbs were the only other plants. Broken tern egg shells in considerable numbers littered the hillside between the tussocks. Three or four old deserted holes resembled P. obscura nesting sites; some holes in the tussocks looked suspiciously like petrel nests, but they too were old. One nest was beneath an overhanging rock and flanked by a tussock of grass. It was half a meter in diameter, and composed of small, coarse herb sticks and grass; a pure white egg shell lay upon it, but no signs of recent habitation. Identity

extremely doubtful.

Sooty terns (17) to the extent of one or two hundred flew aloft to windward and a few noddies (20) flew about the cliffs. Occasionally frigates (34) and minor (or perhaps all minor) passed to windward. One minor male obtained. Two red-foot boobies (31) flew over, circling until one came too near. Four yellow-billed tropic birds (30) crossed through the saddle between the two summits and very long shots were effective, though one bird fell over the hillside onto the sea shelf below. Several terns were shot, but the sooties being high above got rather bloody.

Returning was uneventful. The rope doubled about a secure boulder above the descent afforded safe anchorage while climbing down to the shelf, whence sliding down the oar was easy. Being barefooted helps to descend cliffs because the toes can feel a foothold the eyes cannot see. But landing on the sea shelf near the gap between island and mainland was not so easy, due to conflicting swells. In fact, I missed the first jump and splashed back into the ocean, but the boat was handy, and turning about I caught the bow and pulled myself aboard. Went right back and made a better leap for the rocks next time. The tropic bird was well worth the effort, for he was perfectly clean and spotless, with a good tail and pinkish hue to his feathers. Barked my shin on the bow of the boat sliding aboard from the rocks. The recession of the swells was very rapid and gave little chance for delay in jumping.

It is extremely interesting, this landing on vertical walls of rock with the swells raising and lowering the boat several yards while the attempt is in progress.

In many places along the shore of this bay no sea shelf at all occurs. Where the sea strikes with force, a shelf varying from one to six meters deep occurs according to the nature of the rock. On the windward facet of the island sea cliffs of some extent occur, but not extensive shelving. How much should lithothamnium and fringing corals grow while the sea performs such tasks? The rocks are coated in places with a purplish pink lithothamnium, and bits of elkhorn coral are found along the sea shelf. Otherwise little evidence of coral growths occurs.

October 17

We steamed along shore to Haukaui, put the boat out and picked up Francois who brought aboard a sack of breadfruit and one of taro, the latter tasting excellent at luncheon. This we ate early and put ashore at the dry desert valley of Tapueahu. Mr. Beck off ahead of our over-night expedition. We just passed him skinning a goat.

Here is a gorge some thousand feet deep between walls of thin layered lava. The bottom of the gorge is less than two hundred meters across and is filled with large boulders and flood debris. A bank of former conglomerate river bed deposit is here, ten meters high. Vegetation is scanty, the slopes above the rocks

being mostly tussock grass similar to 1320. Lesser (21) and noddy terns (20) and little white terns (24) about. Warblers singing. The banyan tree is well in fruit, and Franc says that means pigeons.

Goats were abundant all up the ravine bottom. At 750 feet the banyan trees form small groves clear and clean beneath,--a beautiful stretch of pale, whitish barked, straight bowls. Above them hover many white terns, and lesser noddies are nesting upon their branches. Warblers sing from the leafy crown, while high above the canyon walls soar yellow-billed tropics (36) and doves (3). The bottom of the valley has narrowed some and has become more inclined with larger boulders in the stream bed. Candlenut, hibiscus, heart-leaf, and our "almond" are here.

We found water at 1,450 feet, but ere we had all arrived there our bag of pigeons amounted to twenty-four. Ere evening we had twenty-nine, ten more than our two weeks' catch over the ridge in Torea (?). Franc obtained eighteen of the birds against my eleven. I was after flycatchers and parakeets which are fairly abundant here. How different would have been my stay in Nukuhiva had the word of Franc that this was the place to come for pigeons been accepted instead of Brown's information that they were abundant above! Or had I been able to hire a canoe and come around I might have had enough birds to please even the most fastidious. As it was, the time was spent hunting there; here it would have

been all skinning.

It was also interesting that the first birds found were a pair near a nest which I will investigate tomorrow or next trip. It consists of a handful of dry twigs placed in the forks of an upper branch. It is going to be one awful job to get the nest to obtain an egg if one is there. In our day's shooting from three to five-thirty P. M. we killed five pairs in only that many shots. These pairs were sitting closely together, and in each case of my three were uttering a low mourning note, which they answered often enough to permit approaching. Oh to have been left here for three weeks! How much could I not have learned concerning their courtship and spooning habits!

Here, too, the flycatchers are quite frequently met with. I have half a dozen, including two or three black ones and one with much white. A good series of them is certainly desirable. Here also the parakeets are flying about at every shot; green doves and warblers present as elsewhere; terns of three species and yellow-billed tropics,--such a valley could well have occupied a week or more of my time. I do not think I should have been expected to finance a canoe trip around here.

Here, too, are interesting trees, and a study of the fruit eaten by the doves and pigeons would have been interesting, if not of value to the collection. Here the "Pua" greets me with

its orange, fig-like fruit and beautiful flowers. Other trees are in fruit, which accounts for the birds. Old natives claim that this is their nesting valley and that elsewhere they are merely in search of food. Certainly it appears to be the home grounds all right.

We brought but our blankets and are sleeping beneath an under-washed tree stump, where passing showers do not reach us. It was great sport looking over the huge boulders suspended above our heads by roots, the keenest sport of all being when Franc realized that the hundred pounder above his head was only held by three small bracing pebbles caught in the curve of the two roots. He removed it before he could continue sleeping there.

No shearwaters heard during the evening. What a heavy load we'll have to-morrow,--well above fifty pounds of pigeons! It was a restless night we spent upon the rocks, and unnecessarily so for it rained not at all. Not much sound of birds save the noddy during the night, and I think I was awake enough to hear anything that was around.

October 18

Two pigeons fell to Franc's gun in the vicinity of camp this morning before breakfast. After eating I went up stream,

Franc up hillside above camp, Jones collecting in ravine. Each of us got four pigeons. I located two more nests and Franc two, but decided not to waste (?) time on them this trip while birds are spoiling. We are beating it down the scalding hot valley, hoping to reach ship by eleven.

We made the beach, but no ship in sight,--the customary occurrence when a party is ashore. At one o'clock they come into sight. We enjoyed three delicious pigeons for luncheon, roasted on hot stones, "tumm pae". The ship came along at one o'clock, having left Mr. Beck and Louis below, where the latter had an interesting experience with a boar rushing him very savagely and getting dangerously close to his legs. Spent the afternoon skinning, but lay down after dinner which I do to renew my stomach lining. I went to sleep and did not awaken until ten-thirty.

That is the worst of bird collecting: after one has put in a very strenuous day afield so many birds have to be skinned that night to prevent the lot from spoiling. Nor does it avail much to put in two or three hours overtime at night. The minute the birds are all skinned out next day there is a mad rush to get the boat out and hasten ashore for more victims. We commence at six A. M. and, as a rule, quit at eight P. M.

October 19

There is little opportunity to write notes at such a

rate. This morning we ran into Haukaui and let Franc ashore. Now that we know where the birds are we need his services no longer. Of all the Polynesians I have met, he is one of the best,- a man with a big heart, one who is all generosity and good nature. If the Marquesans were all like him, then it were indeed a pity that the race is dying off. Such men are needed in this world, no matter what their color, to maintain our faith in the Godliness of the human animal. There is a man who has never yet left these isles, but "me faro" a heap of things. He speaks Tahitian, French, and fairly good English, besides his own native tongue. To me this Marquesas trip has been anything but pleasant. The only really contented times are like those tonight when I'm utterly alone. It has been a great relief to meet and know such a man as Francois of Haukaui.

Yesterday our energetic cabin boy, Terry, came into the hold and skinned and made up a pigeon in one hour and a parakeet in forty minutes. They say he made good money at Hatutu at one franc a bird. He's about the best cabin boy I've yet seen in Polynesia. He clears the table before I finish thoroughly masticating my food, and has his work finished before half an hour. He is always doing something, and stands the dog watch at the wheel. Today we had him skinning pigeons. I notice that my name was scratched off many labels, nor was Franc's added. Of the first fifty pigeons put up, all but six were collected by Franc

and me. It certainly was a pleasure to watch Franc whenever he heard a pigeon call. Up the hillside he would go on the run, easily outdistancing me. I got but fifteen birds of the thirty-nine. True to my wager when there was great hesitation whether or not it was worth while to bring him around here, he got three birds more than all the rest of us put together. He most certainly earned his thirty francs. We could never have even located the valley without him.

The skinning being finished at about ten-thirty (all save a bird or two for Louis to work on) we had an early breakfast and then went ashore at twelve. Proceeded up valley, paying no attention to the numerous white, lesser and noddy terns, but pausing below tropic birds just out of reach. Never saw goats so thick or so tame. Herd after herd of them we must have passed. Carrying a club kept the dog close behind my heels. He is off his job, however, because of chastisement given for chasing goats unbidden. It is so warm in camp that I cannot wear my sweater.

Obtained three flycatchers before Mr. Beck returned; he took them with him. Then I went up side ravine where I obtained nine pigeons Tuesday. Got four birds, one down where the nine were but the others above the low cliffs. A bird was seen sitting upon a large branch of a banyan tree. I aimed at it from astern and fired. The bird fluttered a lot but held itself

securely to the limb. Another bird flew out from near the first and passed out through the tree tops above me. I made an over shoulder wing shot, and, strangely, got the bird. Then a second shell killed the first. While I was stuffing them I observed a nest in the next tree. While watching it I saw a pigeon hop from branch to branch not far from the nest. It was a young bird hardly able to fly yet. The empty nest was evidently his former home. Here also obtained two flycatchers. The black one gave me a merry chase, and three shells were required to ultimately get him. The other was one of those molly moults from the juvenile brown to the female adult's black and white.

At camp there are two juveniles, but I am not yet so scientifically heartless that I kill my own camp neighbors, although I did shoot a pigeon just below camp. They stop "nawing" well before dark; warblers stop next; flycatchers and parakeets continue until quite dark; white terns quiet down, leaving the early night to the noddies and the crickets. I forgot to mention the two large centipedes found on the heads of cached pigeons Wednesday. One I carried in my coat down to the ship and put him in the pickle.

October 20

Later in the night it became chilly enough for the light blanket. The sugar-cane was none too much protection against the

stones, so at daylight I'm quite willing, nay, anxious to arise. In the reverse order to quieting down in the evening, with few exceptions, the birds commence their morning songs. Noddies' croaking mingled with goat bleats was first heard; white tern clucking next, with parakeet squeaking and warbler whistling about a tie. The swifts are already out after these abundant mosquitoes, gnats and flies (the mosquitoes forgot to retire for the night). No flycatchers yet observed, and no pigeons heard, but doves have been cooing for some little time. To have spent two weeks in such a valley would have been profitable as well as pleasant. Mr. Brown, who evidently could not even find the plants, had told Mr. Beck how very abundant the pigeons were on the plateau above. The native boy's information concerning this valley was disregarded, and I was blamed for not getting more birds. But how gloriously have I been vindicated! How well the boy proved his statement by getting twenty-four pigeons the last trip! They are not so abundant here now. Mr. Beck got perhaps ten, while I got only six last evening. A few parakeets seem to make a great deal of noise. One doesn't find them so thick when hunting them as they sound at other times.

Off after a cold breakfast for flycatchers. They, too, are none too abundant when searched for,--here two, and there one. Now a chattering family of three would all fall at one shot, but the black one I couldn't find after the dog knocked it off a large

rock. A few parakeets heard and some seen, but never in a position for shooting. While hunting, whenever the booming moan of pigeon was heard, I proceeded in that direction. Have obtained but three, and am now high in the left ravine head. Here in the ravine bottom the trees of all kinds, candlenut, "Pua", banyan, or "grape-nut",-- all stand sixty feet or more in height with tall, clean bowls. The nests thus far observed have all been so situated that I have had no temptation beyond desire to try to reach them; nor have I been able to get in a position to observe whether or not eggs were present.

The parakeets were most abundant about a grove of banyan trees high up in the canyon head just below 2,200 feet elevation. Here I obtained three specimens and two winged birds which I carried down alive in hat and field-glass case to camp. There I gave each a berth in my sweater, and so successfully got them to the ship, where they now sit by the day in close proximity like true love-birds. We are greatly pleased to see them already eating bananas, and so have hopes that they will live. I have given them to M. Nagle. The twelve pigeons I obtained last evening and today they were rather heavy before the hot, dry canyon was traversed. I took the journey easily and hunted warblers and doves while resting. The doves are quite abundant in the fruiting banyan trees.

October 21

As I write, this evening I notice Bulwer petrels and obscura shearwaters about, but not in any great numbers. To-day Mr. Beck and Jones went ashore at Marquesan Bay,--the second place Mr. Brown recommended for pigeons. He spent the entire day in the canyon without finding pigeon, parakeet or flycatcher. What odd freak of distribution is this? Water is here abundant and foliage ample, though I cannot vouch for its variety. How fortunate that we brought Francois around to show us where the birds were, and how gloriously am I vindicated in my wager that he would get more birds than all the rest of us, and that a native knows more about some birds than a white man who could not even find the "Pimata" trees and lobeliaoids!

There is a great deal of mystery aboard the 'France'; no one knows, from the Captain to the cabin boy, whither we are bound. It adds a little novelty to the monotony of killing and skinning birds. Speaking of cabin boys: Terry certainly is a dandy. He's so fearfully energetic; he picked up my plate to-night long before I had reached jam and tea. He also skinned out five birds to-day, which doubles his wage at one franc each. He wastes no time upon them and handles tender skinned doves very skillfully. When natives can be picked up who can skin birds so well, why is it so all fired important that I too develop lightening speed?

October 22

It is very gratifying to see the parakeets eating banana and guava. They crush the fruit in their beaks and then eat the soft juicy portion with the brush tongue. We came by the wind until off "Typee" valley and bay, into which we steamed and anchored for a Sabbatical rest. I had no curiosity to go ashore when the valley seemed to be under complete sway of the Society Francais; but over in the other portion of the valley live the remnants of this once populous tribe. Black gnats are very abundant and extremely bothersome.

October 23

Ashore and up the Taiohae road after a prolonged discussion with the elephantiasis victim who is keeper of the plantation. At last Jones convinced him that we had no particular designs upon the live stock of the company. They have some New Zealand stock imported that looks exceptionally well,—sheep, cattle, and pigs. In the alluvial deposits at the foot of the valley they are apparently experimenting upon the growth of various tropical products. The cotton looks exceptionally well and long stapled. It is here the Martinique negroes are to work.

Along the trail a dove was found in the edge of an hibiscus wood. Warblers heard abundantly everywhere. How Melville did falsify his "Typee" story! There are cliffs aplenty, however, at

the head of the valley, and no doubt he only let out his imagination as to the swinging roots. It made good fiction.

Crossed over into vale on the south where hibiscus predominates. Warblers singing abundantly but not many doves about. Here is ideal flycatcher territory, but no response to prolonged calling. Returning, I obtained a young dove, and five swifts on the ridge. The swifts were circling, and it certainly rained during the night. Rains of the day had the trail very sloppy. One shoe sole sloughed off. I have left now one good pair of hobnailed shoes, and the two mimus their extra soles. Found Beck shooting herons at stream.

October 24

My day aboard ship skinning birds while Beck went out morning and evening to get enough sea birds to keep us busy while in at Taiohae to-night and to-morrow for mail. The mail report was a false alarm. He got a letter from Mrs. Beck, but ours is still at Atuana. Spent evening writing and reading, after a full day at the skinning table; only rare birds spoiling can take one into the hold of evenings.

There were five schooners in port to-night,--an unheard-of event. It is quite a relief to our crew to receive late gossip from their home port. To us, however, it does not mean much.

October 25

The morning skinning birds. Last letters at noon. Afternoon ashore and up trail calling vainly for doves. Swifts about and a few warblers. Mosquitoes most abundant. I picked up five warblers and succeeded in getting one dove, but the latter proved to be too badly shot to make a good skin. Returned to the ship at five.

Above is a good sample of notes not written in the field. The only place to record an observation is at the spot where some degree of detailed accuracy can be attained. If it is worth recording at all it is worth putting down correctly what one sees and hears.

October 26

As we left port last night a considerable flock of sooty terns was observed flying high above the islet visited by me ten days ago. They have increased in numbers about threefold since then, evidently coming in for the nesting season. Is this the courtship or the honeymoon flight? Frigates high up amongst the terns, and both boobies (31 and 32) occasionally passing to their roost at the mouth of "Typee". We are heading a little off Hivaoa, where Jones and I will land for about two weeks at Hana Menu on the east by north point of the island. I plan a base camp near

the water there, and a sleeping camp in the higher regions.

To-day Mr. Beck remarked about the small number of birds I put up at Nukuhiva. (We both got one-third as many as ten days in the Punaruu, and the trip cost a whole lot more.) I followed instructions "to hunt pigeons and rail and not to bother with warblers and doves." I, too, can skin common birds night and day if that is what is desired. Night work, however, I consider entirely optional, and so act according to my physical condition. I almost cured my "nervous indigestion" while up there, and that really means more for the remainder of this cruise than two hundred birds would have meant.

I have written my case in this journal because I realize that I shall be considered a failure at the conclusion of my work with the Expedition. If I have failed it is in not being able to accommodate myself to Mr. Beck's ideas. I have labored conscientiously for what I considered the greatest benefit of the Museum as a scientific rather than an exhibitive institution. It is simply up to the Museum to give me an understanding in regards to my work (for which I have written). I cannot and will not devote fourteen hours every day to killing and skinning birds with no notes concerning them. Men not interested in life habits can do that work,--why should I?

October 27--Hivaoa.

Hana Menu: The wind having died down following an early

morning squall we steamed in towards land. Looking over the physiography of this northeast slope I decided that the mountains Heani and Ponoamuu were more accessible up a sharp knife-blade ridge between two large canyons, and asked to run up there and see if there were not water in the mouth of either valley. The one we tried, Hana Hui, was bone dry, so we came back and ran down to Hana Memu which was not a good anchorage on account of the northeast wind, but there is a large spring of splendid water which gushes out of the hillside just beyond the beach.

Here we found a village and a dozen men over killing beef and fish and drying them. Mr. Beck went up canyon hunting. Hearing that the red-cap dove, upon which I am to devote most of my time, was not to be had at this mountain, I went after Mr. Beck to inform him of the fact. He had one young white-cap dove and half a dozen flycatchers. When returning I got one of the latter. Warblers were heard but not obtained. They are very seclusive here, the flycatchers being more easily attracted by sucking and whistling than they. At the boat the boys had a heron, a juvenile bird. On the way to the ship I killed a blue ternlet.

I surprised myself by skinning four birds, including heron, to Beck's five. He wrote labels, but I printed them. I have discovered a little thing which cost me about five minutes on all small birds,--laying down the scalpel. Now I hold it in

my hand until the skin is ready for the arsenic. Did my flycatcher and ternlet as fast as he did two flycatchers. Good health, no worry, and interest are very essential to fast work. Now that it doesn't much matter whether I eventually learn to skin with speed I'm learning more rapidly than I did when I was trying so hard for it.

We are now headed for HanaIapa whence a good road leads over the island to the known range of the red-cap. We have information from natives that the rail is here and that the "Koau" is larger, having a red bill, and feeds in muddy places like taro beds etc., and lives in holes in dry ground. Is it the gallinule? Porphyrio?

October 28--Hana Iapa

We lay off and on throughout the night, working towards Hana Iapa where we anchored at about six. Went ashore and secured a house at the rather high price of 7.50 francs per day. It has keys, however, and the security of locking up the stuff is worth a little. It is so seldom anyone comes here that I don't blame them for charging even exorbitant rates.

We receive much more information concerning the mysterious "Koau". Here they say its plumage is whitish, its legs long (8-10 centimeters), and that it lives in cliffs,--Mona Ootua, whither I go after red-cap doves Monday. Being unable to get a horse and

boy to-day, I took gun and coat from the reef heron killing bo's'n and came up valley where many kingfishers are supposed to dwell. Before leaving village I saw one on a tall dead tree. He escaped, but I got two doves down in the valley there. At upper edge of village behind an old hut in a guava thicket I heard a warbler. Calling brought but two flycatchers, black and brown. The caution of the warblers here is something astonishing. They are more difficult to get than any mountainous island birds of that species yet found. There is vegetation here, which means birds, the ravines and ridges and valley being well covered with trees and shrubs.

The morning's hunt netted me eleven birds, but one white tern proved to be too bloody for a good skin. (Numbers 4965-4974.) There are three flycatchers, two warblers, two white terns, and three white-cap doves,--none of them the special birds I'm to search for, but they help make out "numbers of specimens", which evidently is our goal. My skinning was a bit slow but it is improving. We got well established in the Chief's second house where we have two large rooms and a splendid porch. Heavy showers in the late afternoon and evening. Not many visitors. We have a boy who will take us up the mountain Monday. He won't make his charges until he sees the load the horse has to carry. Wise boy that! Mr. Beck gave me sixty francs for necessary first expenses.

October 29

Barometer 0. Temperature at 6:00 A. M., 74° F.

After many preliminary showers of several minutes' duration and one of nearly an hour, during which we stripped and bathed beneath the rain spout, the real storm commenced at about eleven-thirty, Jones looking at his watch then, and I remarking to him when the first real lull came at four-thirty, after which there was an hour of diminishing downpour. Somewhat after one o'clock I decided to take some buckets from the water spout. Five bucketsful were measured 11, 11, 12, 12, 13, seconds. This morning I measured the contents of the bucket to be 11089.84 cc. and the drainage surface of the roof 505190 sq. c., which gives .0213 c. of rainfall for 12 seconds, .1065 c. per minute. Five hours of solid downpour produced 30.65 cc. From this the heaviness of the storm can be judged. Thankfully we didn't find transportation to the mountains yesterday afternoon. The river this morning was lashing around the roots of cocomut trees high and dry yesterday. Such a storm should bring a week of good weather in an ordinary country, but here in the tropics it may mean the beginning of a stormy spell. To-day, however, has broken clear and sunshiny with passing light clouds. Here is a reminder that a scientific expedition especially for studying ecology should carry a rain-guage or so. A little sun during day and some pictures of our hosts.

Our guide and another boy who is going to accompany him for a pig hunt are here giving us information: "Koau", a bird whose body is no larger than a warbler's; the legs are 20-25 cm.

long (?), eyes red, bill red and 10-15 cm. long, toes about half as long as his finger, claw one cm. long. The bird stands up and calls "Kō-au" (au as ou in "out"), then ducks under brush and changes his location. He burrows into the ground, making as many as four entrances (12 cm. diameter); hence, it is necessary for four people to catch him. Three make a great deal of noise at three holes, the fourth keeping quiet with a net at the other entrance. The burrows are several meters in length. Are we in so mad a rush for so many birds before Christmas that this mystery is not to be solved? If we leave this island without that bird I'll be inclined to jump ship and job and everything else to hunt for it.

The curlew is called "Keuhe".

Tatler is "Tuki".

Red-tailed tropic is "Tauvaki".

White-cap dove is "U'u peti".

October 30

Last night a Tahitian living here told us a big tale about a "Popa Frenchman" (whose ancestors were Germans and kanakas) upon whose land Mr. Beck was hunting Saturday, and who owned the top of the island where we propose to hunt. He did go to Atuona Saturday, this fellow says, to get the authorities there to stop our hunting here. That set me to searching, and lo! my permits are left aboard ship. I'm in a nice mess if a gendarme does come

over.

Off this morning for the hills to solve the mystery of the "Koau". Upon reaching camp our packer informed us that the mysterious "Koau" was only to be found along the western mountain range. Betting at present is about 1000 to 1 against the existence of the bird. Along the route I obtained two black flycatchers, two swiftlets, and half a dozen doves, two of which were in juvenile plumage. After erecting shelter, using the larger portion which affords bounteous protection, I set to work at skinning the birds. When one's boss doubts one's sincerity if not under observation, a keeping of time is necessary.

6:00 A. M.--8:00 A. M. Packing and breakfast.

8:00 A. M.--2:30 P. M. Traveling.

2:30 P. M.--3:00 P. M. Erecting shelter.

3:00 P. M.--6:00 P. M. Skinning six birds.

Heard no mysterious sounds during night. Thought once that I heard rostrata.

At 6:45 P. M. barometer 2,000 feet. Cloudy. Thermometer 67° F.

October 31

One warbler tried to bring daylight an hour or two ahead of time. At daylight a flycatcher joined him in ushering in the dawn. A rail heard in near-by ferns. Doves cooing well after dawn, but not abundant. After cooking breakfast over a fanned

fire we left camp and followed along the trail towards the east. It comes out upon the main ridge beyond the higher peak and follows fern-clad ridges down the eastern end of island, a rather extensive stretch of rolling plateau at less than 1600 feet with several valleys out into it. Only one or two doves seen and heard,--color not identified at distance. Warblers singing from pandanus and hibiscus in ravine heads. None of them accessible from trail. How wild and cautious they are here! Pandanus and hibiscus greatly predominate the vegetation. Rather cloudy around the peak which rises but two or three hundred feet above the trail here and appears to have no different foliage. The red-caps must live on the other side of it. I see or hear no signs of doves on this side.

At camp I was settling down to skin birds (four white-cap doves (3) left over from yesterday and the flycatchers (44)) when, water being needed, I made a move and roused a kingfisher (49) from the trees overhead. He alighted close by while I returned for the gun. Of course he had to make a nose dive into the mud below him and get his white head and breast dirty. Two kanakas, one a Chinese caste, passed a little after one o'clock. They stopped and conversed a while with Jones. Knew very little about birds.

After finishing the skinning I went out towards the west

and followed a cow path up a ridge towards the mountain. Warblers (56) singing abundantly, but was unable to locate one within gunshot. I called one dove out of a valley and got it,--white-capped (3). In a ravine head I first noticed the parasitic flowering plant on the hibiscus; returning to camp I found it so all along the trail. A dove (4) came flitting over the ridge just ahead of me. Missed the auxiliary shot but got him with the ten, Noha performing as a good retriever. To-day has netted two specimens especially sought,--almost as bad as Nukuhiva!

To-night at a little after seven o'clock I heard the Pterodroma rostrata calling at length from the neighborhood of the higher peak. Thither go I in the morning.

To-day's time was employed thusly:

6:00 A. M.--7:30 A. M. Cooking breakfast.

7:30 A. M.--10:30 A. M. Hunting along east trail.

10:30 A. M.--12:00. Preparing and eating lunch.

12:00--3:30 P. M. Skinning seven birds.

3:30 P. M.--6:00 P. M. Hunting along west trail.

Total results--7 specimens. Numbers 49.

While at lunch Jones made a jump and landed with his heel fairly upon the neck of a centipede. With the bonebreakers we got him into the pickle bottle. The natives said it was just a young one and that this is a regular encampment of them,--a delightfully encouraging remark!

November 1

I was sorely tempted this morning to go on a shearwater hunt, but decided in favor of the red-cap doves (4). Jones having fairly well collected the plants here, he returned this morning to Hana Iapa where he will collect until Saturday when he brings more provisions and the camp mover to carry our things over against the other mountains, the big range for next week's hunting. In a pandanus grove I heard a kingfisher chattering. Stalking failed to locate him for a shot. Twice he flew from trees near me to distant ones, from which he laughed mockingly at my futile efforts to reach him. They have two distinct calls here, one an easily distinguishable kingfisher chatter, the other a series of lightly trilled calls in rapid succession. They are rather wild and when taking flight usually fly a distance. While after him a dove flew over me. It proved to be only a white-cap, but I'm taking and skinning every bird I can get. Otherwise my showing will be worse than at Nukuhiva. It is indeed strange how these two species of doves so thoroughly intermix. White-caps are everywhere. So far as my own observations are concerned the red-caps have been seen only flying over the ridges. But they must inhabit some valley where fruit trees grow. I have been calling for some time above a "Pua" tree richly laden with its red-orange fruit, but have received no response. Warblers are singing in every direction this morning but I have been unable

to stalk any. They seem unreasonably wild and seclusive here at Hivaoa.

I found the food trees abundant on the ridges of the valley north of the trail, and after my calling at length and killing two white-caps, a red-cap came flitting through the trees, alighting on the end of a low, dead branch. This is the first bird I've succeeded in calling. In this territory I hope to find a few of them. Showers somewhat against good hunting. Also called a warbler and a second came into pandanus overhead, but they are fairly safe in those tangled masses of leaves. Beneath these food trees the ground is littered with berries dropped by the doves in their eating.

Followed a cow path on over the ridges until next the broad, hibiscus-filled valley which faces west of the mountain "Ootua". Hearing no sounds of doves, I concentrated upon warblers (46) which were very abundant in the pandanus along the ridges. I obtained four here, with the able retrieving of the dog. Also obtained another black flycatcher here. Returned towards trail, until, finding myself not far from the place where I had killed the red-cap, I made a short detour there and fortunately so, for another red-cap was obtained upon arriving at the trees. An hour of calling brought but one white-cap. Realizing that I had enough birds to skin during the rest of the day, I hastened to camp,-- half an hour of brisk walking. Delayed just above camp and cut

some upright dead hibiscus which made a splendid fire this evening.

Luncheon and changing plant blotters kept me busy until two-thirty, when I set to work upon the birds. At six o'clock I had eleven skinned, including five doves. Dinner upon fried dove breasts with onions and rice. Hauled down the wood and changed blotters again. A shearwater heard briefly just before seven o'clock,--"Noha" (Pt. rostrata). I am very greatly tempted to go for them in the morning.

The program of the day was as follows:

6:00 A. M.--6:45 A. M. Breakfast.

6:45 A. M.--1:15 P. M. Hunting.

1:15 P. M.--2:30 P. M. Wood and luncheon and blotters.

2:30 P. M.--6:00 P. M. Skinning 11 birds.

Results--11 specimens.

(4) 4988-90. (3) 4991-92. (46) 4993-97. (44) 4998.

Number 4989.

One red-cap dove had in its crop the mature seeds of the parasite so common throughout these woods where it grows upon hibiscus as well as upon the host at Nukuhiva. How odd it does not grow upon the hibiscus there! I watched diligently to find it upon any other host, but never succeeded during three weeks amongst it. Here it is more prevalent upon the hibiscus. It is interesting to find that the doves do eat the berry. Natives had

informed me so, but the actual evidence is always best. The flight of the red-cap is much more quixotic and rapid than that of the common white-cap. The bird is a little smaller. The whiteness of the other bird's head shows up so plainly that a red-cap can always be spotted on the wing. One white-cap I plucked for eating was laying. The males (all birds skinned to-day) were swelling, large, or breeding. Warblers and flycatchers also seem to be breeding. Again the call of "Noha" comes down from the mountain above. I'm off in the morning, birds or no birds, to try for a record of the rostrata nesting here.

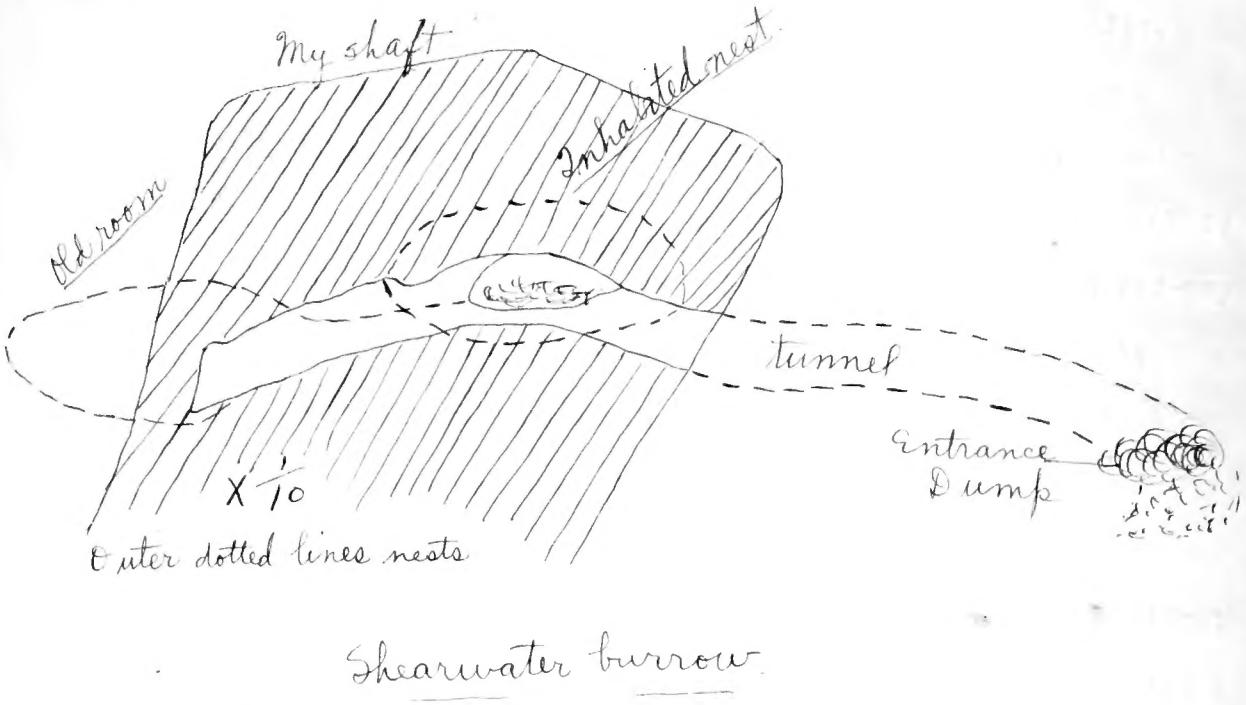
It is marvelously moonlight, but up here beneath the summit a cloud bank is all but perpetual day and night. For a very few hours during the very middle of the day a little sunshine finds its way through the bank. It is delightfully cool, the thermometer last evening registering 65° F. at seven P. M., 64° at one A. M., and 63° at six A. M. this morning. There was very little cloud last night. To-night it was as high as 67° F. at six-thirty P. M. The moisture makes it rather chilly, however.

While I was skinning birds this afternoon a black flycatcher came into the tree branches nearest camp, perked his little tail upwards, and chirruped about for half an hour or so.

November 2

A nice clear morning with little or no dewfall is

propitious for the mountain climb. Took the ridge just east of the camp ravine. Warblers all along the trail and black fly-catchers. Found one small "pimata" and the purple lobeliad at 2,450 feet on side of steep slope,--may not be able to reach them. Have seen no others. At 2,700 feet I came upon the dog with his nose in a shearwater hole. The fresh clay dump at the entrance to the burrow was very encouraging. The familiar "Noha" call told me that the owners were at home, or one of them. A sidehill shaft entered at the proper place, and a stick prodded the bird in the nest three arm lengths farther in. While digging there came a quiet footstep at the door,--the host was inquisitive. The dog let out a yelp and went for his namesake. A sharp nip on the nose only aggravated him. After killing this bird (how tenaciously shearwaters cling to life!) I went on with the digging with hopes of an egg. Instead I found another bird. The soil is a hard, drab clay <u>in situ</u>. An old, abandoned room is the oddest part of the nest. Both rooms are slightly lined with bits of dead fern stalks and pandanus leaves, rubbish which is very abundant just outside the door. Had I a good tripod I would try to photograph the nest, getting a cross-section of the burrow. On the following page is a sketch of the burrow.



Shearwater burrow

On up to the fern-clad summit (2,775 feet) where "pimata" lobeliad, a white-flowered shrub and the red-stamened tree (not in flower or fruit) grow sparingly, with hibiscus reaching to the very summit and guava present. Freyinetia (small variety), also the edible berry. Excellent specimens of "pimata" obtained. One coarse grass grows up through the ferns. Swifts about and a lesser noddy above the rocks. A pair of green doves (3) flew out of "pimata" grove,--I wonder whether they feed upon it. A beautiful view of the island is obtained from here when the mist is not present. On the other mountains next week I expect to find more of these intensely interesting

indigenous plants.

Returned to camp at twelve for lunch, then on after red-cap doves. I followed along regular road two ravines farther than usual. A few white-caps along the ridge. Needing bamboo for making skins, I cut down into ravine bottom where a grove was observed, then followed up ridge towards the red-cap tree (plant specimen No. 1344). One white-cap obtained with auxiliary from low tree along trail to which he flitted from above me. Spent one hour at the grove of dove trees and succeeded in calling and getting two red-caps. How easily recognized they are by their strikingly different colors and actions! The red-cap is more flighty and restless. One was but wounded and we had an awful time finding him. At last the dog found the scent ascending a slanting tree limb, and there we flushed the winged bird. The dog was upon him instantly he struck the ground. I turned loose to keep the dog from ripping the skin and skidded down hill, not noticing loss of "tipi" until reaching coat. The dog retrailed directly to it. Hastened back to camp after getting a warbler. One hour and a half of skinning before dark.

The program for the day was:

5:30 A. M.--6:30 A. M. Breakfast.

6:30 A. M.--7:00 A. M. Blotters and patches.

7:00 A. M.--12:00. Ascent of Mt. Shearwaters.

12:00--1:00 P. M. Luncheon. Blotters.

1:00 P. M.--5:00 P. M. Hunting red-caps.

5:00 P. M.--6:30 P. M. Skinning birds.

Results: 2 shearwaters, 2 red-caps, 3 warblers, 2 white-caps obtained. Rare plants, 6,--3 specimens.

November 3

Late arising this morning. Plants required considerable time to get them into press and notes written. Doves and shearwaters were very fat and required more time than usual. At two o'clock I took a sweater and grub and struck out for a night out in the woods. Along the ridge road obtained a red-cap dove in ravine off road; a centipede in trail made me a little skittish about going up on ground for the night. Pickled the centipede. Have called half an hour at the grove of dove trees without results. Hearing kingfishers below me I'm off to see if I can locate them.

They were perched near together on the topmost twig of a dead tree, and fell at one shot. One was able to glide off some distance and would have been lost save for the dog. We followed the trail on over into the next large valley. Jumped a bunch of wild cattle,--they're as wild as any elk or deer ever are. Called doves without success until five-thirty. Then my stomach commenced to ache, so I gave up the notion of sleeping out and started back trail. First stalked a cooing dove, but it was only a white-cap. The dog too acted very sick while returning.

The program of the day was:

6:30 A. M.--7:30 A. M. Breakfast.

7:30 A. M.--9:30 A. M. Pressing plants.

9:30 A. M.--1:30 P. M. Skinning birds.

1:30 P. M.--2:30 P. M. Lunch.

2:30 P. M.--6:30 P. M. Hunting.

Results: 6 specimens.

November 4

Awakened at six-thirty by a kingfisher, but could not locate him. What is worse than awakening all tired out and sore from an uncomfortable night of little sleep? Spent the morning skinning birds and changing blotters while awaiting arrival of the native. Decided that I should remain here in the known habitat of the red-caps a few more days. As Jones had an attack of dysentery he did not come up. Sent boy back after lunch with message to Jones to send him up again on Wednesday, when I will move camp in spite of red-caps.

Out after lunch and into the valley where the doves have been found. No results save a warbler until as I was returning campward. A red-cap was obtained from the uppermost tree of the grove which had already yielded four of the six birds taken. These trees are abundantly in fruit, and the doves, with white-caps apparently came there to feed. How discouraging it is to hunt half a day, and call and call with such meagre

results! Too tired to cook dinner,--just played out. There is no writing of notes under such conditions, and there would be no hunting if obligations did not demand it.

The day's program was as follows:

6:30 A. M.--7:30 A. M. Breakfast.

7:30 A. M.--10:30 A. M. Skinning birds, blotters.

10:30 A. M.--12:00 Lunch.

12:00--6:30 P. M. Hunting.

Results: 4 specimens.

November 5

Slept in this morning until a spell of sunshine made bed uncomfortable. This being Sunday and the shotgun cased, of course two kingfishers had to come about camp. Should a really scientific collector pay any attention to the religious Sabbath? A shower at eleven A. M.

"Moko" is the lizard.

"Nana" is the gekko.

"Viri papa" is the centipede.

"Pipi taiammu" is the snail.

I had a visitor this afternoon, an oldish looking native with his face well tattooed, and he was proud of it. A broad belt extended from ear to ear across nose and mouth; a belt also ran over the right eye, left eye and surrounding region clear, right forehead clear; left forehead belted with

half a dozen broken marks at inner, lower end. He contradicted the carrier as to "pimata", giving that name to the plant so similar to the Nukuhiva one. Gave me several other names. He was very interested in the Noha and wanted to know how I obtained them. He was also amused to think that I remained alone at nights, mentioning the "tupaupau". Traffic along the trail has been very scarce the past week. Bad cramps to-day.

To-night I heard Noha call twice,--the first birds heard since my successful hunt Thursday. Am back on my diet of cereals and milk.

November 6

After skinning the warbler and red-cap dove obtained Saturday and spreading plant blotters to dry I struck out for the dove trees. Half an hour here has resulted in two young birds, one apparently the white (3); the other is undoubtedly a red-cap, having just a few colored feathers at the base of the bill; irises are of about the same shade of olive brown; bills the same dull, green-tinged brown-slate. How sadly one needs a color chart! If these soft parts are of any importance whatever why not make accurate records of them? The feet show the marked difference of pale burnt sienna and a dull purple tinged drab. The orbital ring of the red-cap has commenced to show color, being pinkish flesh, while that of the other bird is drab.

Save for a hint of the yellow band across the tail tips of the white-cap their general dorsal appearance is quite similar. Ventrally, white-cap begins to show the salmon pink tips of breast feathers, while red-cap has the orange feathers fairly well developed. Here perhaps we have the ancient ancestor of both species. What gets me is that two species should develop here on this one island. The only explanation I can see is that when this island was a few thousand feet higher the birds divided into a lower and upper zone. The sinking of the island (evidenced by the drowned valleys) has crowded the red-caps down into the white-cap zone, where the latter bird is slowly exterminating the former because of its more adaptable nature, and probably more diversified food.

There were two or three white-cap adults in the trees this morning, but I resisted the temptation to kill them. A few hours with nothing but white-caps in the trees feeding. I call at length (the white-caps regard me curiously) and stroll from the lower trees up to the one where Saturday's bird was obtained, and the young red-cap this morning. Linger there at length and return below to obtain another young white-cap. About ready to quit in late afternoon when I stroll again to upper tree and obtain another red-cap not yet in mature plumage, but far advanced over the young bird. Two red-caps seems my day's limit.

Again I am fairly wornout after a day of no excessive exercise. My legs are devoid of power and falter at the least

up-grade. Have a severe headache in addition, this evening. Is this all due to my stomach? It seems so. After reaching camp I lie down an hour after taking asperin; then arise and run out two red-caps. If I am going to do any night work I'll have to devise some method of a better light than the lantern gives. Retired at dark. Heard a shearwater (Pt. rostrata) about seven.

The day's program was as follows:

6:00 A. M.--7:15 A. M. Breakfast.

7:15 A. M.--8:30 A. M. Skinning two birds and blotters.

8:30 A. M.--4:00 P. M. Hunting (4 doves).

4:00 P. M.--5:00 P. M. Asleep.

5:00 P. M.--6:00 P. M. Skinning two birds.

Result: 4 specimens.

November 7

A brilliantly moonlight night when I awoke after a sound sleep produced by the asperin. How peaceful and quiet everything seems on such a night, the mild, soft light of the full moon glittering on the jungle leaves! Towards morning the flycatchers commence chattering, and as the day breaks the warblers join them. Later the doves commence cooing. I loiter at breakfast, for it is a morning to be enjoyed, not thrown away

to ambitious haste. Then two young fat and tender doves occupy an hour. My tattooed friend stops in on his way home. Filled with amazement, he watches me stuff a bird. He says something about flour, but we are short of that if we have to hold out all week.

Somehow I feel that the ship will return, though this is recorded after it is known, so do not hasten from camp. Two curves down the trail I meet Beck, Fatina, and two local natives with horses. I return to supervise the packing, eat lunch, and then strike for the dove trees. At camp a white-cap flies overhead. Beck says it was right here that he obtained the three last year, yet not one red-cap has been observed in this vale in eight days. As I round the second curve down the trail, however, a flutter from the trees near-by and a flash of green and yellow draw a wing-shot. It proves to be a red-cap, the second on this side of the divide, and the third not obtained from the feeding trees.

Upon my arrival there three white-caps are at lunch. I do not disturb them until well assured that no reds are near. From the upper tree I shot a white-cap and then proceeded to follow this valley to the trail crossing just above Hana Iapa, whither this runs. Why did I not strike a red-cap when down after bamboo last week? To-day I found them quite abundant below there, obtaining two, missing two, and hearing others, for

I am positive that I can now distinguish their call from that of the white-caps. It is of a higher pitch and more doleful,--one has to put a lot of real pathos in an imitation of their call; while melancholy would well describe the white-cap's call. What is the mystery of this bird's development? I am sorry now that I didn't move over on Saturday to the other mountains. The big question is whether or not the red-cap dwells there, and if not, why not. We, in our fruitless endeavor to complete the Marquesas Isles in this four month voyage, have left Hivaoa finally, with that problem unsolved and the "Koau" still a mystery. However, Louis claims to have identified that name with the rail, which being heard and seldom seen would fully account for the myths.

I found the red-cap doves' crops full of the fruit of the parasitic plant, and their intestines containing the uninjured seeds from which the pulpy coat had been digested. That accounts for the distribution of that plant, so oddly parasitical upon the hibiscus here and not found on the tree it inhabits at Nukuhiva,--a tree very rare here. It was interesting to find none of these seeds in any white-cap dove, though more specimens should be examined before any conclusions are drawn. Sometime in the future, if I have nothing else on hand, I'll revisit the Marquesas and straighten out these problems. Reached ship at

six P. M. Six specimens to-day.

I have now visited four of the Marquesas Isles,--Huapu, Nukuhiva, Hivaoa, and Fatuhuku (see next book), and am of the decided opinion that the essential reason for no coral fringe being formed is that the islands are sinking too rapidly to permit such a growth. Some specialist will have to visit these isles in a chartered schooner, for it would be sea work to settle the problem. At none of the isles is there developed a sea shelf or wave bench of any noticeable extent. What there is is barely deep enough in the walls to permit one to land and pass from point to point when waves recede. There is a certain amount of littoral coating in the rocks in the inter-tidal zone, but only where the continual splash at low-tide keeps them moist. From the report of everyone aboard, the north islands are similar, except the so-called "Coral Islands", which is (there being now but one) an extensive bar of white sand but three meters above high-tide, and no doubt awash during storms. Extensive shoals surround the bar. Its being white sand would signify that it is composed of coral, but a landing and investigation at close hand can alone determine the fact.

In all my rambles here I found no rock that bore any trace of other than volcanic origin, no fossils of any sort being discovered even in recent alluvial deposits.

The general average height of the so-called plateaus is

from twelve to sixteen hundred feet, and at Hivaoa and Nukuhiva show unmistakable evidence of erosion, leveling at that altitude approaching peneplanation. The gorges,--there are no real valleys,--have been cut into this plateau since then, which hints at an elevation of that much. But why no fossil remains if that were once the sea level? A geologist well versed in volcanic lore and a student of coral reefs could find some interesting problems in these isles.

Botanically I am very anxious to see the report of Brown of the Bishop Museum of Honolulu. I don't believe he succeeded well in the higher altitudes. Team work is essential in such collecting. Brown should have had some young enthusiast with him who would have scaled the summits for the sheer joy of it. I regret that our plans were shortened here at Hivaoa. Had I been forewarned, I most certainly would have visited the main mountain range which must present even more interesting plant distributions than the Nukuhiva range. Mona Ootua alone was interesting in this respect.

BOOK XXXIII

Second Cruise of the 'France'

to

Fatuhuku, Uahuka, Nukuhiva,

Hivaoa, Tahuata, Hivaoa.

(Marquesas Isles)

November 8--30, 1922.

Fatuhuku

November 8

The ship let us off at the edge of the shallow green water which extends a mile in places from the rock that is Fatuhuku. The landing was splashy, due to the rather high sea

and our windward position. The latter was necessary for access to the slopes above. The island is a series of lava flows with interspersed ash beds which form a receding series of ledges accessible with a few acrobatics. After landing on the rocks and getting rather wet by splashing waves we followed along the wave-washed shelf a hundred meters or so to the accessible slope which led to the saddle between the two portions of the island. Beneath this saddle a cave passes through the ridge connecting it to rocks. The saddle was about four hundred feet elevation. Here our guide left the ridge and followed around the left face of the higher mountain. Rocks loosened by our progress splashed into the sea below, after bouncing once or twice on protruding knobs. Our objective was the lower extremity of a sloping ledge of ash and lava in which I found one thin bed of salt quite prominent. We got around the end of this ledge by notches hacked into the rock by ancient natives of Hivaoa who used this island as a burial ground. Some well made rock tombs were found near the summit.

Ascending the slope, a ground dove was obtained, poor and scrawny looking. There are very few tussocks of grass here and that seed is perhaps their staple food. The yellow-barked tree with sticky fruit, found so commonly throughout these Polynesian islands including many of the atolls, is located here on every shelving slope and covers the summit of the island almost to the exclusion of all other vegetation. It affords ample nesting sites for numerous red-footed boobies (31) and frigate birds (34)

the minor also being present. A shot put a large portion of the inhabitants to flight, and a very conservative estimate would number them at one thousand in the air at once. More frigates than boobies. White terns (24), a few noddies (20), and some lesser noddies also about the trees, with the little blue ternlet (19) nesting on the cliffs, where they were usually in pairs. At one place a seepage of water runs down over some rocks and forms a green spot on the deserted face of the cliffs. Here were obtained two more ground doves.

On the summit was a small patch of grass tussocks and a few low shrubs outside the grove of trees. Here were found several of the doves. I offered five francs for a nest, but the natives were unable to locate one in spite of the numerous tussocks of grass in which promising holes appeared. In the grove, which is absolutely barren ground, the doves were found wandering about individually and perfectly innocently, regarding us. Even when we shot, they would seldom fly far. Some were observed perched on twigs of the yellow tree, where they seemed to be eating the seeds. These seeds, when mature, are very sticky, adhering to anything they touch. It is very likely that the distribution of this particular tree is due to sea birds, especially the lesser noddy which is fond of this tree as a nesting site. I have never passed through a grove of these trees without noticing that bird. The ground doves were not overly abundant, and so

when we reached the ordered fifty we stopped shooting and at noon started for the ship. Picked up six more birds at the water seepage, where I surmise they assemble for one of three things, or all of them,--moisture, shade, or food. I very foolishly nibbled a couple of sardines and had a couple of severe attacks of cramps before the boat arrived.

Descending, I found how much better it is to go barefooted, for then one can feel where a notch or rock is safe for footing with the bare toes. Though the rocks were scorching hot I made shift from the moist place to the boat.

Skinned from three to five and six to nine, minus one hour for reading mail. Twelve specimens.

November 9

Uahuka

Skinned birds during the morning when not abed holding my stomach. I'm off sardines for life. The Captain says he thinks these have been in stock in Papeete about ten years,--hence sold cheap. The poorest form of economy is cheap food. Plain, common food is all right if varied a little, but cheap food usually costs much more than the best grades. The discontent and ill health of the crew resulting from cheap foods costs much more than the best food would cost, through loss of labor. The Captain says he never ate as poorly as we do on any trading

schooner, and the rest of the crew agree with that statement. We have a good cook, but he hasn't the variety of things with which to vary our diet. Our meat is all boiled or corned beef, without a tin of tongue, tripe or anything else. We have seen no bacon or ham on either cruise. Here in the Marquesas we might buy chickens, but we haven't the money along with us.

Here is a flycatcher not a meter from me, giving me the once over. How common they are here at Uahuka, and how curious! It is a young bird and is now begging food from its black headed parent. The grayish bodies are much more common here than the black,--in fact, I have not seen an all black bird without a white feather. They also have a light clicking noise not heard before. It is repeated in rapid staccato time.

November 10

I felt somewhat better to-day and was ready to go ashore, but remained to skin out some swifts and flycatchers. After lunch I had another attack of indigestion which floored me an hour this morning. I'm on milk and cereals and dry vegetables entirely. The very thought of sardines, salmon, or pork and beans makes me sick. I didn't come on this trip to starve myself or knock my stomach out. It is a marvelous opportunity for scientific research and observation,--just the very opportunity I had long dreamed of. But I am not foolish enough to

needlessly ruin my health merely for science. If we couldn't carry or secure better food there would be no excuse for kicking, but we can.

I came ashore at noon and, after stopping to see a carved model of the old war canoes, came on up here in the valley head to hunt doves and warblers which are rather scarce. Flycatchers very abundant. I did find two doves, one at a red-berried, walnut-leaved, cedar-barked tree; the other at a banyan. Hibiscus and maupi groves cover most of the valley head, and the former extends high up the slopes. We are on the southwest of the island at . The parasitic plant is here dwelling upon the maupi, but I have not yet found it on the hibiscus. Jones saw it on the soap bark, as at Nukuhiva.

Returned to ship late rather indisposed internally. Fell asleep after dinner.

Uahuka to Taiohae.

November 11

This was Armistice Day, but we didn't notice it until arriving at Taiohae.

Awakening at 12:30 A. M. and being unable to get off to sleep again, I went below and skinned out my birds. After breakfast I set to work upon Mr. Beck's birds while he made a raid on the islet at the harbor entrance, where he found sooty (17) and noddy terns, reef herons (28) and one P. obscura. I heard the latter commence calling at three forty-five this morning,

and the last bird was heard at five-fifteen. There are many cliffs here ideal for their nesting.

Since my landing at Nukuhiva Mr. Beck has had me tallying my birds by keeping my numbers separately from the rest. This week we finished the six thousandth bird of the expedition, the last thousand being obtained in six weeks. He says I obtained only one of five, a mathematical error, for I did twenty-seven of one hundred. What an unfair comparison to make, too, because all my work was done on land where I was ordered by him not to bother with green doves and warblers, but to get pigeons at Nukuhiva and red-crown doves and kingfishers at Hivaoa. Had I desired to make a showing with numbers I would not have hunted for the special orders in almost utter exclusion of common birds. Personally, I think I did the very best I could do for the chief interests of the Museum. I have written the facts elsewhere. Here I merely wish to record my opinion of Mr. Beck's unfair comparisons. I was ashore under special orders where those birds were hard to obtain, while the ship was visiting heavily populated bird islands where the sailors, Jones, and Louis killed birds while Mr. Beck concentrated upon skinning and had also the assistance of Louis and the cabin boy. Louis can skin birds even more rapidly than I, for he has skinned many more than I have and is naturally active and skillful with his fingers. Furthermore, having ruined my stomach by living upon the cheap food of the first expedition and camping ashore,

and sleeping out when too tired and busy to cook good meals, I have been laboring under the irritableness of indigestion this trip. This ends my services as a bird-killer and bird-skinner on the wholesale principle.

At Papeete I leave the Whitney South Sea Expedition, first, because of the food which apparently will be the same,--cheaper and less varied than that of the trading schooners about here; second, because I am not in perfect concord and harmony with the present leader of the Expedition. I have worked conscientiously for what I considered the best interests of the Museum, concentrating upon birds and information about birds, and then adding whatever else I could of scientific interest. Mr. Beck is unable to appreciate the value of scientific notes; he takes photographs only where they are perfectly easy baby-play. He figures birds skinned per dollars expended, and so commercializes the work that all real scientific research is impossible. For such work I am certainly not fitted, hence the break. In my hours of good health, which have been very few and far between, I have timed myself and know that I can skin birds sufficiently rapidly to make it worth while,--but I am not bawling about that. I am perfectly satisfied to leave, although I would like to see the islands this ship is contemplating visiting. There is ample work in this wide world for any scientist. An expedition of this kind could be made a wonderful opportunity, but as it is, I don't consider it worth while.

Arriving at Taiohae, where we came to meet the steamer because of indefinite knowledge whether or not Mrs. Beck is coming upon it, we found it due to-morrow. How many times we have been here, and how we seemingly sail around a lot but don't get anywhere! Why not clean up one island at a time and do it thoroughly, not so much in numbers of birds but in surveying it, and in touching representative districts. The high mountain range of Hivaoa and the desert side were sadly neglected. The natives report some bird eating fei. Shearwaters, no doubt, are to be found nesting there. The two I found appear to have a different season from the Moorea birds.

Nukuhiva

November 12

This morning comes Louis back from the administrator with the information that there is a law prohibiting the shooting of all land birds save chickens, pigeons and doves. The administrator has obligingly given us permission to kill three birds of each prohibited species. Here is the result of our inconsiderate actions, our total disregard of the authorities, and our disrespectful attitude towards them. We sail into a bay, go ashore and commence shooting birds without so much as inquiring whether the land is privately owned and posted. We do not first present our credentials and permits to the administrators, and that naturally insults them. Haste makes waste.

November 13

Up early this morning to write letters concerning the near future. At eight A. M. in the little boat with Fautina and out to the islands to see what is to be found there now. The sooty terns should be nesting. I have the camera along, and if the birds are nesting will take it ashore. As we go I snap pictures of the interesting geological features. A layer of somewhat columnar basalt capping the ridge west of the bay is the first objective. The strata of these ridges slope at the typical lava flow angle, and if they ever continued until they met those opposite, the island was at one time high and rugged. The sooty terns (17) are here at the island and appear to be nesting. We are going to search for a new route this time and so avoid the climbing performed last month.

The landing was not so very uninteresting, in spite of tranquil sea and good vertical walls with a nice niche into which I stepped. Without the gun, or with a sling upon it, I could have proceeded easily enough. I called for the rope, and then with the gun securely fastened to it, I risked resting it in a very precarious position on the ledge above. Bare feet are certainly the thing for rock work. I scrambled up and made the rope fast to a projecting boulder in a bed of conglomerate. The rest was easy, so I returned and secured camera, egg basket, and dog. As we approached the island, some sinister looking dorsal fins recalled to mind my briny bath upon the former occasion, but they proved

to be merely large Manti. While putting on my shoes one huge fellow approached the boat several times, exposing his bulky back. His side fins extended farther than the two ends of the boat. I peppered his back with # 6 and he sank with one great upward flap which brought both fins well out of the water. The last I saw of Fautina he was rowing to other regions to await my return. I do not blame him. If one of those Manti flapped a flipper under the boat it would turn turtle or porpoise and dive. I'm writing in the cool shade of the summit of the island while winding after the hot and sultry climb. The terns are above me in abundance, and saucy as can be. We saw them alighting above, so expect eggs. First, however, a picture of the tussocks of grass forming their habitat and then a new roll of film for what might be above.

There was a small flock of birds on the further summit, but they raised upon my appearance over the brow of the nearest hill. Not an egg was to be found. Dung sign gave evidence of considerable resting upon the land, but nothing more. Shot away all my cartridges, getting only ten birds, but all of them are fairly clean. One noddy (20) shot, and not more than half a dozen about; one lesser noddy (21) passed over the island; three or four frigates (34), one booby (31) and one tropic bird (36). Took a long shot at the latter but missed him; the rest were not within range. It was interesting to see the way the

scoty terns kept coming up wind. Where and when did they circle back to leeward? At sea it must have been, beyond my sight, for I watched especially, but could not follow a flock long enough to make out.

Uahuka

November 14

Shavay bay. Jones and I ashore and paused to look over a bed of volcanic ash superdeposited unconformably upon more primitive lava. Here, too, is an ancient paepae, so old that a tree four meters in diameter has grown up above it,--the sticky seed tree. Against the rock we find a portion of a skeleton. What is it? Neither dog nor cat, so we collect all bones discoverable and carefully wrap them up. Perhaps it is that of a sea-otter, the foot bones being very elongated. We have found most of the leg bones, save one long leg bone; other small bones, perhaps some vertebrae, are missing. It is now too hot to work here, so we plan a little more exploration upon our return. Spent one and a half hours upon this skeleton, but I think it well worth while.

As we proceeded up the valley (a typical dry desert ravine) we could see that enormous depths of ash were deposited above the one at the base of which we found the skeleton. What a barren place it is! There is a little yellowish red ant running about this page that is not a millimeter in length. Horses

very abundant here. Warblers and flycatchers in the first hibiscus trees and low shrubs. The former flush, and wing shots are easier than coaxing them. Up against the cliffs above the slope are flocks of what appear to be domestic pigeons. I'm planning a trip up there to investigate upon my return. Five plover (25) flushed from the dry, grassy hillslope. Very hot and sultry.

Warblers were feeding in isolated trees from which they flushed at long range. In this way obtained about nine birds. We found water about four or five kilometers up canyon where the forest filled the ravines. Here half a dozen doves were obtained. Some were called, but others were shot as they passed over a point of ridge. I stopped at a banyan "aoa" and there got three more birds. Returning, shot warblers and a tame pigeon, which saved climbing the hill to verify that suspicion.

November 15

This morning skinning birds while Mr. Beck landed on a couple of islands five miles up shore and obtained several Bulwer petrels. East of this bay "Shavay" is a flat-topped islet, elevated some meters above sea and apparently composed entirely of a slightly metamorphosed sandstone. A peninsula west of here is very similar. We sailed near it and I took some snaps as we passed. It certainly looks sedimentary. Mr. Beck conceived the

idea of my ascending a canyon here and crossing over to Shavay, but I could not see it that way at all for an afternoon's jaunt.

Came ashore at one-thirty and rushed up to water where only three doves were obtained. Rushed back, and then reached boat at six P. M. to eat a miserable, cold dinner. Not feeling well, I went to bed afterwards. Took down some flycatchers besides the doves. I had told Mr. Beck that with a full day I thought I could get a few doves and warblers, but knew it was useless to run up for one hour's hunting. I misjudged ravines and got up the wrong one, too, so lost most of my hour of hunting. Doves are here, but, like the warblers, they're wild and not to be called.

November 16

Spent a miserable night and was very tired and sore between the shoulder blades this morning. With Jones I went ashore and up to the water; thence up the ravine to eastward where doves were seen yesterday. Shooting flushed about twelve and all passed over the ridge where I had been yesterday while they were where I now was. Killed two pigeons in valley and two up here on ridge. A few warblers coming up this morning. Doves left after the morning shooting, and none called all day. A very poor day and a miserable one,--only twelve birds. Beck found green doves very abundant in an "aoa" loaded with fruit.

November 17

Another miserable night as we sail leisurely before the light breeze towards Nukuhiva on another trip to see whether the French steamer has arrived. These sleepless nights, combined with a stomach-ache, are convincing me that the sea life is not for me. I am getting so that I dread the sight of the ship. I fear I must devote my life to continental rather than insular studies, and to landbirds in preference to sea birds, and to plants in preference to other life.

Fautina and I went ashore at the east point to hunt boobies and frigates. We killed a goat from the boat. Spend the morning hunting chickens, but pick up a few frigates also. Boobies nesting abundantly in pisonia (elsewhere referred to as "yellow-barked, sticky-fruit tree"), which grows in clumps upon the desert slopes. Goats abundant. But few terns about; also a few swifts. A magnificent view of the mainland from here, with just the tops of the distant range. While above a grove of pisonia I saw a lesser noddy flying about with what appeared to be a clump of the sticky fruit of that tree,--a verification of my suspicion that the sea birds distribute that tree. Here are three or four seeds still clinging to Noha after he swam twenty meters to the boat. We found chickens and cats here. Both apparently live well from the thrown up fish of the sea birds.

Nukuhiva to Hivaoa

November 18

The steamer was present, but Mrs. Beck was not aboard. We left at six P. M. with the Administrator of these isles and Mr. Jewett as passengers for Hivaoa. A good breeze far enough north of east allowed us to make a direct course, and at noon we are just off the island. Made four good miles per hour. Had a three course breakfast in honor of the passengers, a splendid meal showing what our cook can do when given the material. The big pig killed yesterday (bought at "Typee") and chickens helped amazingly. But the rest of the month? Boobies and frigates did not last out the morning, thanks to Louis' help!

Upon our arrival at Atuana we are met with the information that all this island surrounding this village has organized and delegated one member to write us a letter forbidding the killing of birds upon their property. This interferes with our latest plan, which was to leave me here to scale the mountain range behind town. It may also prevent search for and capture of the mysterious "Koau". We were informed that a certain old woman owned the mountain, and after much trouble secured her permission to hunt there. I do not know whether a good camp can be found above the valley. Plantations extending one thousand feet high occupy practically all save the steepest, rockiest land. Met the Washburns. Mr. W. is a painter and an entomologist of U. of Minn.

November 19

Spent the morning aboard ship writing and reading and washing clothes. After breakfast went ashore and called upon the entomologist, Washburn, where I visited for about three hours, learning some kinks about insect collecting. Saw Exploding Eggs (Fiu) and engaged him for three days' trip to the summit of the peak if possible. He and some boys came aboard with me, where they identified the rail as "Koau", putting an end to the mystery. If there is a bird eating fei I suspect it to be the myna, which is noticeably more abundant in Atuana valley than it was two years ago. What will the story be in ten years?

November 20

Ashore at seven with provisions for three days, and up the trail with Fiu. I was this far (1,000 feet) in January, 1921, shooting white-cap doves, white terns and swifts. All three of these birds have been seen to-day,--terns and swifts plentiful; doves flying from "aoa" trees; warblers singing abundantly; I have not yet observed a kingfisher. Owing to the ban of the proprietors we are not shooting down in the valley. We have a few hundred feet more of grass and fern-clad hilltop, then the trail zig-zags up a shoulder of the mountain range. It can be seen where the more dense vegetation occurs. Varney forewarned me to

take along a sack of guava wood for fires, everything up there being moist from fog. Fiu now tells us that we will not find water above, but I camp up there this night if it is a dry camp.

We pass near a rivulet about 1,200 feet, and as it is ten o'clock we stop to lunch upon biscuits, butter, pork and beans, and bologna sausage. The latter was purchased at Nukuhiva in August and now has a flavor none too appetizing. My tender stomach revolted at the first mouthful. Nice, cloudy weather prevails here, as it probably will during the rest of the trip. I came off without the butter, milk and jam this morning,-- a very serious affair because they are essential to the enjoyment of rice, mush, and biscuits upon which I may have to live. A few straggling cocomut trees are up here against the mountain wall. From one thousand feet down they grow exceedingly well. Pandanus, maupi, and hibiscus are the prevalent ravine trees, with occasional others. The cedar-barked, walnut-leaved, red-seeded tree is here. No signs of the parasitic plant yet.

The last cocomut tree was at just 2,000 feet where the trail left the hilltops and started zig-zagging up the mountain wall. Here we enter hibiscus woods with large barrel ferns and much "paavatua", which resembles "avaava". Snails are here and the parasite on the purau. One white-cap dove seen and shot at with auxiliary. A female flycatcher (44), showing all white save head and wings, observed feeding young birds in a nest that looks

obtainable. I blazed tree to call attention to it on return trip. It is very hot and the ground is well baked, signifying some time without rain.

2,600 feet. We come out upon the point of the shoulder and have a magnificent view into a semi-circular vault betwixt this and the next ridge, nearly two thousand feet down to the hibiscus wooded floor and the walls as vertical as lava ever gets for that distance. Little vegetation upon them. A dozen or more yellow-billed tropic birds (36) flying about the cliffs. Warblers still heard. Typical vegetation of the zone just below the perpetual fog. Beetles very common along here on the "paavatua", and three kinds of snails. Eight tropics (36) above me as I write.

3,000 feet and above the horseshoe vault mentioned previously. What a magnificent view of the amphitheatre of Atuana, the bay, and the ravine gauged plateau to Mona Ootua! From here the purau woods of that region loom up very strikingly amidst the fern-clad ridges. At this altitude the tree ferns commence, but they are small dwarfs.

"Kotupu" is the Hivaoa name for ground pigeon on Fatuhuku.

"Kuku pakioe" is the green-cap phase.

"Kuku foama" is the white-cap.

"Kuku peti" is the red-cap.

We decide to pitch camp at about 3,400 feet where the trail rounds a shoulder, from whence I can hear shearwaters if they call. Leaving the guide and a boy who followed us of his own volition (or perhaps through Fiu's intrigue) to make camp and prepare dinner towards evening, I followed on up trail. In the ravine just above camp where half a dozen fei grow and the "maapape" weed is abundant, I obtained a young white-cap dove, and the shot flushed an old bird of that species from the "pimata" trees opposite. A female flycatcher also obtained; later another shot, but even the dog could not locate her in ferns. In the bottom of the large ravine around the head of which the trail winds is a large bed of fei, but only one bunch of green fruit is noticeable with the aid of field-glasses.

The trail reaches the summit of the ridge at about 3,850 feet and follows along at that altitude past half a dozen or more knobs. Along here I wandered, calling and watching for red-cap doves. Several white-caps were observed, but none of the other species. I proceeded until a splendid view of the Hana Memu district was had from a vantage point on the ridge down which the trail leads to that valley. There the white-cap doves were even more abundant than usual. Nothing but this species observed returning to camp. A few swifts here.

Temperature at six P. M., 55° F. Early to bed and slept soundly until twelve. For an hour then I heard at least one "Noha" (Pt. rostrata) shearwater calling above us.

November 21

Temperature at 12:15 A. M., 59° F. At 6:00 A. M., 60° F. The barometer gives 3,300 feet this morning here at camp, and 3,750 on the ridge. We went to the left to the summit of the first knob, where it registered 3,900 feet. Beyond was the summit, perhaps fifty feet higher. There was no trail and the brush was altogether too thick for reasonable travel. Half a kilometer of such jungle is not worth as much as twice along the Hana Mema trail. We obtained one red-cap there, but had the good fortune to get three more along the ridge trail. Have seen several, but am perfectly unable to call them near. Shooting the auxiliary scares them and some come near enough to get. White-caps more abundant than the others. It is odd that I did not see any yesterday. All these ridges and ravine heads are dominantly dotted with the "pimata", with the small tree fern protruding through them, in some places forming a patch of radiating fronds. The sharper ridges, and especially the knobs, are conspicuously a mass of broad-fronded ferns and dead moss.

I returned early in the afternoon to skin the four red-caps (4) obtained in the morning. Again saw two at the ravine head where we lunched, and missed a perfectly easy wing shot at one. Several flycatchers along the route, but I did not bother them. At four o'clock the boys returned with no further success. The doves seem to feed in the mornings and not move much later.

Temperature at 6:00 P. M., 62° F. At 6:30, 60° F. Barometer, 3,300 feet.

November 22

Temperature at 12 plus A. M., 59° F. At 6:00 A. M., 60° F. Barometer, 3,350 feet. This daily variation of the barometer is extremely interesting. The day dawns soon after five. The clouds on the eastern horizon are tinged with gilt about five-thirty, and a few minutes later the sun comes up from behind them. Our oiled silk shelter spread low across the trail pit in the shoulder ridge collected a quart or more of water during the night. The ferns and grasses saturate us to the hips as we go through them this morning up trail. I decide to camp at the place where the most doves have been seen. One red-cap flies over us, too near for a large shell, and the auxiliary only sputtered. Two others passed along the ridge towards the highest points. They are moving about much more than in the evenings, which would account for my not seeing any the first day.

About midnight I heard a shearwater from up here somewhere, but I could not exactly locate him. There is one chance in a thousand of coming upon his landing place. I have watched carefully for sign, and have worked the dog on all possibilities. There are so many shoulder ridges bracing the main one that I have no hopes of locating a burrow of but one or two birds. The season

may account for no more being heard, although the two obtained at the other mountain appeared to be commencing to swell. The sun ungratefully hangs behind a dark cloud and the wind is not very pleasant. Fiu returns down trail with no game. This ridge hunting is rather trying upon one's patience, but to leave the trail is the height of folly. The jungle is altogether too thick to see through, and is in places impenetrable. The cloud continues to hang above the peaks and us. For an hour no doves have been around. Fiu claims, and perhaps truly, that cloudy weather is not propitious for dove hunting because they do not fly about then. It is cold and miserable where we are wet by the morning dew. How welcome is each bit of sunshine that breaks through the clouds, and this but 9° south of the equator in November! The temperature at Atuana is very equable, the surrounding mountains cooling it off until it is quite pleasant.

Sitting here at the head of a densely vegetated ravine, looking down upon the barren hills above Hana Menu, one is convinced of the truth of the maxim, "Water is life". Down there is a temperature more equably hot than up here, but here is left all the moisture; nor is it deposited as rain. Perhaps more is precipitated as dew and condensed fog than actually falls as rain throughout the year. From below it was impossible to realize the extensive drainage system of Hana Menu. These heavily forested, moss-covered ravines must act like sponge resevoirs,

absorbing immense quantities of water from the clouds, which slowly seep down to the ravine bottom and flow down the full length of the dry canyon to Hana Memu, not to mention that which penetrates the lava beds and emerges at the beach in as beautiful a spring as ever graced a canyon.

Either Fiu is correct about the clouds and doves, or else we've scared the birds away from the vicinity of the trail these last three days. One thing that strikes me is the splendid rail conditions, yet not a bird have I heard these three days. Did I mention the presence of a few noddies about up here? White terns pass over the ridge occasionally, but they are found more abundantly lower down where the trees are larger. Townsend calls them noddies. What is a noddy,--a tern?

At noon we break camp and commence the descent of the steepest trail I ever yet have climbed. How was it ever discovered? What incentive led the early natives to climb up this precipice with the aid of ropes? Here on a point of the shoulder I pause in the sunshine (we are already below the shadow of the cloud) to watch the aeronautics of Phaëthon lepturus. How I long for the day when I can conscientiously sit and watch them soaring hour after hour! The boys have gone on. I did not like the idea of being on a zig or zag below the horse for fear of his kicking rocks over the edge of the narrow trail. Several noddies about the cliffs this morning.

Here is the flycatcher's nest, and in the trail opposite, the grim evidence of a woodland tragedy,--all that a hungry cat would leave uneaten, the wing tips and tail feathers of the male bird. Here was an enemy he knew not by hereditary instinct. His bravery in defense of his little family cost him his life. The black and white female is in the trees above me. I might collect her, but I'm not going to, for that would leave the nestlings to starve to death. The tree leans out over the cavity below the trail uninvitingly. There are times when even the vague excuse of science cannot induce me to kill a bird. White terns are becoming more abundant as we proceed into the region of the hibiscus,--3,000 feet minus.

November 23

At Motane Louis found a very interesting bird. # 6150 noddy tern (note seeds of Pisania entangled in feathers). The seeds in clusters were so thick that the noddy could not fly. Here, then, is that definite evidence I have been watching for all along, and the distribution of one very common tree throughout the Polynesian Islands is accounted for. Here in the Marquesas are the white-cap doves on every island except the northern group and Fatuhuku. Banyan trees are reported from Eiau. What I am wondering is whether or not this bird ever migrates or moves from isle to isle. If not, why so little variation in them? This is a problem equally applicable to P. coralensis of the

Paumotu Archipelago. At one atoll there we found nests which greatly resembled dove nests, but no birds were obtained. When fruit becomes wanting on one atoll is it not probable that the birds fly over to another, especially when within sight from the low tree tops? Personally I believe it quite probable that the green dove in ages past carried practically all the edible fruit seeds from isle to isle. The native has a legend about a bird gathering banyan fruit from the moon and depositing that sacred tree on the various isles, according to Ellis.

To-day we sailed across to Tahuata, the near neighbor of Hivaoa. Here the intrepid Harris landed and survived alone amongst cannibals for seven years.

I skinned birds until shortly after nine o'clock, when an attack of cramps combined with a splitting headache drove me to my bunk, where I slept it off by four P. M. Mr. Beck had little success here, but succeeded in finding the kingfisher and obtained a young bird, which externally and superficially shows a great resemblance to the Todirhamphus of the Society Isles. I wonder just what are the generic distinctions. A green grasshopper was found in the throat of one bird (39). He saw no flycatchers, doves were high up, and he obtained only one warbler. We will have to search around at different valleys where the other birds may congregate in more favorable situations.

November 24

Everyone ashore to-day hunting, Mr. Beck along ridge summit, whence he brought back some of the fog-belt plants. Louis and I went into the valleys, where few birds were found. Warblers and kingfishers in dense tops of maupi, where also some doves were calling, but I could not stalk them. Found one young bird in a clump of the parasite growing on maupi; one warbler and one kingfisher from maupi woods. Three white terns (24), which are very abundant here, and a swift completed my day's catch. Picked up two more kingfishers just above the cocomuts. Returned early and had my birds--nine of them--skinned out before the rest returned. In the evening skinned four of Louis' birds.

The striking feature of this island is the apparent absence of the flycatcher so common on all these Marquesas Isles save Nukuhiva, where it was found only on the desert side. The kingfishers are much more abundant than in Hivaoa. We have already obtained as many here as there. The doves are not very abundant in this valley, but Louis found them more plentiful on the ridge to the east, beyond which Mr. Beck found them abundant. Swifts are about in considerable numbers, and warblers are singing everywhere. I saw one kingfisher fly out from his perch on a tree top and act as if catching an insect on the wing.

November 25

Hearing of shearwaters on the ridge, I started for it

to-day, via Mr. Beck's route, but was too weak-kneed to continue the jaunt. While we were drinking cocoanuts a nut fell upon my coat and struck the barometer, breaking the crystal and jarring it to 3,000 feet. Found doves all along the route, but had brought only a few cartridges, intending to travel light up the mountain where there is nothing to shoot, according to Beck. Obtained warblers, kingfishers, swifts and doves, sending them back by Louis. The kingfishers are fairly common in the iron-wood trees, where also the warblers are abundant. The doves were feeding upon guava and peppers and also the red-berried, cedar-like-barked tree. A banyan tree was a sure place to find them, but often tall cane-grass beneath prevented the dog from retrieving. He is all sore along the belly from the grass.

Returned to ship late in afternoon just in time to take to bed with an attack of cramps. This chronic sickness has driven me to the last measure I ever expected. I am almost fully resolved to return immediately to a temperate climate,--to America where I will continue my studies, and when next I venture away it will be towards the pole and not the equator.

November 27

Louis and the Captain off this morning with native friends to hunt pigs and birds in a neighboring valley; Beck in the boat to another; Jones and I with a guide up the mountain

ridge not ascended Saturday, to search for the bird that eats fei and lives in a hole in the ground. Apparently this is a conflict of observation, or else a new bird to our collection. I imagine that rats eat the fei, and shearwaters live in the holes. One native aboard ship yesterday told wild tales of how the noha ate fei when fishing was bad. They alight on the tree and grab a claw full of ripe fei, flying away to dip it in sea water before eating it,--a necessary precaution as all fei eaters know.

We hit a bad stretch of unused trail from the village valley up to the ridge just below where we quit Saturday. It would have been much easier to have gone around. We certainly intend to return by the good, long trail. At nine o'clock we are well along the ridge up above tree ferns and in the zone of interesting alpine plants growing just below the fog-belt. Warblers singing, and swifts about. Even the white terns are scarce here. Our guide claims the red-cap dove is here but very scarce. I see no reason not to expect them so near Hivaoa, whence they could fly readily. Both "pimata" and "pohei" here, along with other typical fog-belt plants. White-crown doves scarce.

We stop at the summit and indulge in an early lunch. The guide and I then start for the fei bed. Along the trail I spotted a shearwater hole and found in it a well developed downy bird. Sorry I did not bring some traps or my blanket. I may yet

decide to stay and freeze during the night to catch a parent bird. At the fei bed we find no birds or ripe fruit, but I secure a nice flower and small cluster of green fruit for botanical specimens. One old husk of a ripe fei shows signs of having been eaten by bird or rat. I collected it.

Amatea Mona. Just after turning to the right along the ridge through some low ferns and ascending the next knob the dog rushed down to the right and commenced digging at a hole. It was a very short burrow, not a meter in length, beneath the roots of a shrub. In the nest was a downy youngster, which I collected returning. The first mouth cotton we used to grease our guns with. I stuffed his throat then, and now all that cotton is saturated and the native is carrying it along wrapped up in paper. This is the greatest island yet for measuring worms. Probably the lack of flycatchers permits their increase.

Our guide has no idea of the whereabouts of the bird which eats the fei. From his description, they are pigeons giving a call like the Nukuhiva bird, "Rupi", but he says they more nearly resemble the Tahitian bird, G. aurorae. Warblers are singing all around us, but none very near. One or two yellow-billed tropic birds were observed flying about the cliffs on either side of the ridge. The windward side is much steeper than this,—and this is not an inclined plane by any means!

The ridge we ascended was not at all difficult, but the

tall cane-grass is bothersome stuff to travel through. We are now back in the ironwoods and will hunt doves, warblers and kingfishers. Obtained but three doves and two kingfishers, one of the latter being shot on the wing, which is very difficult, owing to the wavy flight.

Warblers did not reveal themselves, though several were heard. At the beach we met the Administrator and Washburn, the entomologist, who had just arrived on the 'Commodore' en route to Uahuka, where a native has cut up his wife. Cause,--a Chinaman on the third side of the triangle.

November 28

Off to search the deep canyon along the trail followed three times for flycatchers, while Louis and Beck skin out yesterday's birds. I suppose at the end of the next thousand my numbers will be checked up against theirs. I go hunting every day under orders, they alone remain aboard skinning. Personally, I prefer it that way if no insinuating references were made about the number of birds I skin. The only skinning I get a chance to do is after dinner, when my time belongs to myself, and when one should relax from the day's employment. Well, my health has reached such a low ebb that I am decided not to venture another expedition under any conditions. First I must cure my stomach and then, keep out of the tropics.

November 29

This morning we ran around to the bay opposite Atuona. I stopped in the dense woods near the beach, which is composed of about 7-8 parts coral to 3-2 of volcanic rock; the coral coating on this island is more developed than any other Marquesas Isle I have visited, but does not yet form a reef. Collected warblers, which were more easily obtained here than anywhere in the Marquesas. Was ready to go aboard at ten, but the boat was to come at twelve as first arranged, so I went on a fruitless chicken hunt for two hours.

Returning to the beach I found the boys standing off opposite a pile of fire logs. The beach here is very steep too, about as steep as sand the size of wheat kernels can slope with high surf pounding it. We had a great time loading the boat, and when we eventually got away the gunwales were but a few inches above water. Had a good string of warblers,--twenty-three.

I refused to let Louis help skin them, and at 1:05 set to work to satisfy myself that I could skin birds better than I had hoped to be able on this journey. An average of twelve minutes and forty-two seconds satisfied me by two minutes, eighteen seconds. I took every bird, bloody ones first. Lost the tail feathers of one moulting bird, but otherwise got good results.

Mr. Cadwallader Washburn, the artist, came aboard and thoroughly enjoyed looking over our representative birds. We

were due to sail this evening, but I requested permission to remain and visit him on Thanksgiving day. Request granted.

November 30

Had a roast pig (Polynesian turkey) and all the trimmings to pumpkin pie for dinner at noon, after which I went ashore for my visit. What result? Mr. Washburn is interested in bird eggs, and when I suggested helping him it did not take long to make a satisfactory agreement,--work far more agreeable to my peculiarities, more intensive.

Went aboard and packed up, much to everyone's surprise. I flatter myself that the entire crew, from Captain to cabin boy, and even the little red pig, regret my "desertion". I like them, everyone of them, and I like the prospects of the ship, but I like my stomach best of all. Here is a job on land for at least five months,--a chance to give my stomach a complete rest from sea, sardines, and salmon.

Thus endeth my part of the "Voyage of the 'France". My health forced me to withdraw, just as it prevented note writing, hunting and skinning on both the cruises. It was a good opportunity, but I didn't have the "guts".

FINIS

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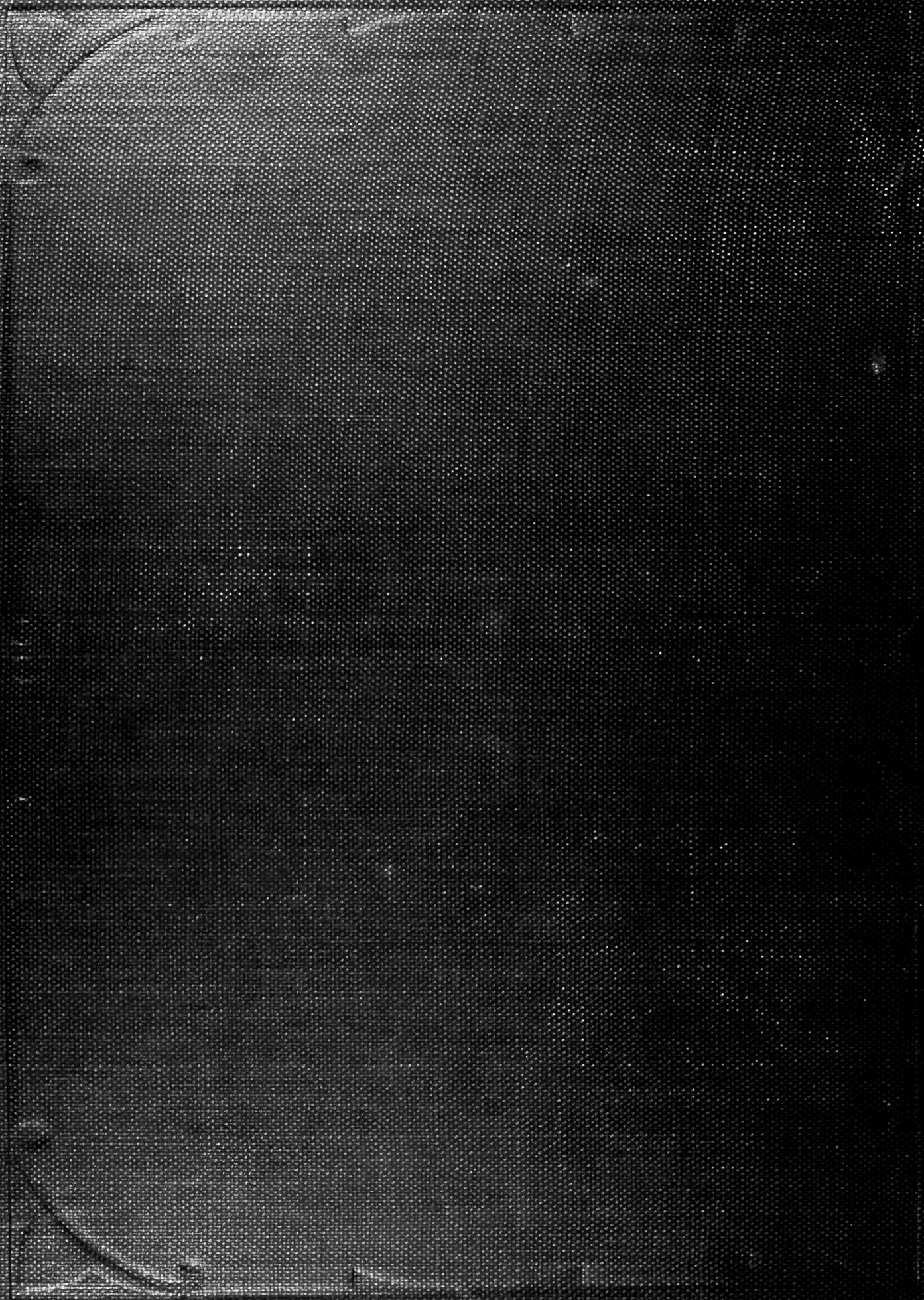
Sketches, color notes and further observations by Quayle, page of Burke's Journal, Vol I

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